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**ASAT'S:
PART OF A COHERENT SPACE CONTROL POLICY**

BY

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ABSTRACT

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Today we are at a revolution in military affairs that defines space as the ultimate "high ground". With the growth of both military and commercial dependence on space it is only a matter of time that space will, like land, sea, and air, become another environment to conduct warfare. This paper will examine the growing importance of space not only to a nation militarily but also economically. It will then review current U.S. space control policy and determine if the policy is coherent and adequate. During the examination of the U.S. policy this paper will address the two major space control courses of action: space sanctuary and weaponization of space (specifically anti-satellites (ASAT's)). Next, a nation will be studied to determine if possible "triggers" have been pulled that would dictate that the U.S. develop space-based ASAT capability. Finally, the paper will recommend the future space control strategy.

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ASAT'S: PART OF A COHERENT SPACE CONTROL POLICY

INTRODUCTION

It has been a long-term axiom in military circles that the person who holds the "high ground" has the advantage in military operations. The "high ground" gives either friendly or enemy forces a better field of view allowing enhanced reconnaissance or surveillance activities. It allows increased ability to communicate with friendly forces and makes possible better lines of communications as well as providing a better location to defend or launch an attack. Today we are at a revolution in military affairs (RMA) that defines space as the ultimate "high ground" where the above-mentioned advantages are geometrically increased. Indeed, with the growth of both military and commercial dependence on space it is only a matter of time that space will, like land, sea, and air, become another environment to conduct warfare.¹ Space-based capabilities are an integral part of our information driven society, and of our national security structure. It is both a vital interest of the United States and other world powers as well as a critical vulnerability for the United States' Armed Forces, which can be exploited to attack our command, control, communications, and intelligence capabilities. Current policies, strategies and plans habitually single out space control as a critical aspect to ensure access and use of space to enhance U.S. national power. However, after review of applicable policy and planning documents it appears there is a disconnect between the requirement to control space and policies that outline how to satisfy those needs.

National and DoD policy must be strengthened, to include a focused allocation of resources, to both protect our investment in space and if necessary deny the use of space based systems to an adversary. The real question is: "How?" There is no need to discuss if space should or should not be militarized. Space has been militarized almost since the beginning of the space age. The issue is: should the United States weaponize space to achieve space superiority? Or should the U.S. adopt a "non-weaponized space sanctuary" policy? Its imperative that a clear and coherent policy and vision be articulated and decisions made.

THE ENVIRONMENT AND FUTURE TRENDS

There are numerous books and articles that clearly track the evolution of space activities. It is not the intent of this paper to layout in great detail what has happened over the last half a century. However, it is important to briefly outline and understand what has occurred in space since it became a medium in which mankind has operated. In the early days, both the Soviet Union and the United States were leaders in space exploration and leveraging space assets for military applications. Space exploration focused on both science and national security. Intelligence collection, communications, and missile warning were the early military assets to first move to the "high ground" of space.² Over the last twenty years, other nations have also embarked on space activities that were clearly for military applications (e.g., intelligence collection, command and control, and navigation).³ Finally, with the exception of anti-satellite (ASAT) activities of the Soviet Union and the United States during the "Cold War" years, there is to date no indication they, nor anyone else, has "weaponized" the region of space.⁴

The use and leveraging of space assets truly came to light over the last decade. Space system capabilities were effectively demonstrated during the Gulf War. They were the sentries, communicators and navigators of Operation DESERT STORM. Execution of the force enhancement function of missile warning, communication, navigation, weather, and reconnaissance were the first integrated application of space power in support of the warfighter. The results were eye watering. The air component commander of US Central Command and of allied coalition air forces in 1990/1991, General Horner, noted that space forces came through with dramatic results for coalition forces during Operation DESERT STORM.⁵ Space assets provided critical communications infrastructure aiding immeasurably in the command and control of coalition forces. Global Positioning System (GPS) satellites allowed coalition forces to move with precision and speed at an unprecedented level. Additionally, GPS allowed the use of precision guided munitions that not only increased the accuracy and probability of kill of these munitions but also decreased the risk of airman lost to enemy ground fire.⁶ The results of space system support during Operations DESERT SHIELD and DESERT STORM can be viewed as the catalyst for a new era in military doctrine. General Colin Powell said, "The United States learned from Operation DESERT STORM that it had to achieve total control of space if it is to succeed on the modern battlefield."⁷

Since DESERT STORM the military reliance on space assets has steadily grown. Referring to the 1999 Balkan action, Secretary of Defense, William Cohen, stated the United States had successfully completed "the most precise large-scale campaign in the history of airpower, the first air campaign in the history of warfare to compel a ground force to capitulate."⁸ The precision and lethality the Air Force brought to bear on Serbia would not have been possible without the same space force enhancement capabilities used during the Gulf War. GPS again provided the precise guidance to U.S. "Smart" bombs and spy satellites supplied coalition forces with critical intelligence on the disposition of Serbian forces as well as providing battle damage assessment on Serbian targets hit by coalition forces.⁹

In the wake of all this military activity and capability in space, another incredible trend has developed and is picking up speed. There is a mind-boggling movement of earth-bound commercial capabilities to space. The 1997 National Defense Panel Report stated, "In the next ten years, more than 1,000 satellites are projected to be launched. This represents a total investment (including all related services) of more than one-half trillion dollars."¹⁰ Where industrial might once fueled the U.S. economy, the U.S. is quickly transitioning to an information-based society and space is the critical ingredient that makes this age a reality. General Moorman quoted a Business Week article that supports this assertion:

... 'some of the most dynamic entrepreneurs of recent times are hooked on the great space race and orbiting egos will enhance a drama already fueled by mind boggling sums.' The names of the players make anyone sit up and take notice: Bill Gates, Rupert Murdoch, Craig McCaw, and Bernard Schwartz. The projected investment in a host of communications-satellite programs, which account for the bulk of the one-thousand-plus satellites projected for launch, totals about \$40 billion."¹¹

The U.S. is not the only nation that has embarked in the information-age via the space-faring revolution. General Moorman also cited Space Publications and the consulting firm A. T. Kearney, who have estimated that space related worldwide revenues are currently \$88 billion annually, and are

projected to grow to \$117 billion by 2001.¹² Over the next ten years a total of 1,500-2,000 will be launched worldwide by both government and commercial ventures and approximately one third of these satellites will be built outside the United States. Quite simply the space industry is now a global venture. Over 20 nations have vigorous programs in the space infrastructure arena. And of the 20, the principal nations are the U.S., Europe, Russia, China, and Japan.¹³ General Moorman, in his article "The Explosion of Commercial Space and the Implications for National Security," gives a quick run-down of what other countries are currently accomplishing in the space arena. Since the 1960s the Soviet Union, Great Britain, France, Canada, and several international consortiums have built and launched communication satellites. This aspect of space commerce continues to grow. There are several new communication programs under development by both the U.S. and foreign companies. The countries involved in the developing communication satellite capabilities include Russia, Brazil, Germany, Belgium, Mexico, and a 79-nation consortium called ICO Globe. Another blossoming area in space commerce is launch services. Space-launch services have historically been the sole domain of the government. However, the unresponsiveness and high costs of the U.S. launch systems has driven the commercial sector to expand and provide increased services. The French Ariane vehicles have arisen as an aggressive competitor. Additionally, the Russians and Chinese are providing space-launch services to both government and commercial sectors worldwide.¹⁴

Space based remote sensing is another industry that appears ready to explode in the next 10 years. Several U.S. companies, like EarthWatch, Inc., Space Imaging EOSAT, and Orbit Image (ORBIMAGE), are able to provide three to one-meter resolution space-based images to any consumer. International remote-sensing systems either flying now or scheduled to fly in the next two to three years are provided by French, Canadian, Indian, Japanese, Chinese, Brazilian, Israeli companies.¹⁵ No longer is it the nation that has developed and deployed its own reconnaissance satellites that can have access to critical, near real-time imagery to aid in both a diplomatic, economic, or military decision. Any country can now buy the information. This isn't a cheap proposition, but it is certainly a lot less expensive than having to develop a nation's own organic capability.

In addition to the U.S. reliance on national space systems to undertake critical missions in support of warfighting; and the worldwide proliferation of commercial space assets and technologies outlined above, an even more threatening trend is developing. There are several future studies and estimates that emphasize the proliferating threat of anti-satellite technologies. Most alarming is that these threats and developing technologies can be used not only by mature space faring nations, like the U.S., Russia, and China, but also low end adversaries. Missiles capable of reaching orbit are proliferating, as are satellite jamming systems, kinetic and directed energy technologies, weapon guidance, space surveillance, and satellite tracking technologies.¹⁶ Many of the studies highlight that counterspace can be achieved in four ways: denial and deception, ground segment attack/sabotage, electronic attack, and space segment attack. The space segment attack, to include ASAT interceptors, can also be broken into several categories. The weapons range in sophistication from kinetic impact, directed energy, to nuclear. All of

these weapons can be delivered either terrestrially or via space.¹⁷ Jamming technology is the most likely and easiest way to counter satellites, however, there are ways to thwart this threat and at a relatively low cost. Therefore, depending on the will and resourcefulness of an actor a particular country may find it in its interest to neutralize satellites by other means. This brings us back to attacking a ground and/or space segment. There is no need to discuss trends on neutralizing a ground segment. This can be accomplished using existing military and terrorist assets. With existing technology detonating a nuclear device in space can be easily accomplished; however, this type of attack is far from surgical and carries a lot of political baggage. Direct ascent kinetic ASATs are a challenge to develop and deploy. The United States Advisory Board study, "New World Vistas..." point to the fact that kinetic ASATs, "...are complex, and tracking and guidance must be precise."¹⁸ In a recent Jane's Intelligence Review article; however, Mark Mateski does an excellent job in detailing how it is not that hard nor expensive for amateur satellite observers to track satellites. This would leave most to ascertain that if amateurs can perform the rudimentary function of tracking satellites then a motivated nation should be able to reach a higher level of accuracy and sophistication. He then clearly explains how any nation with a ballistic missile capability can deliver an ASAT into at least the Low Earth Orbit altitude (the altitude that most reconnaissance and communication satellites transit) and that it is not hard to imagine that a regional power could duplicate or even improve on proven ASAT guidance technology already demonstrated by the Former Soviet Union and the U.S.¹⁹

IMPLICATIONS

So what does this mean? Current capabilities and the future trends outlined above simply imply that the U.S. is facing a RMA in space itself as well as in the threat arena in the next ten to twenty years. Even though the discussion above was not intended to completely outline all of the existing and future trends, the synopsis does highlight two critical points that support Alvin Tofler's thesis that the "way a nation makes wealth is the means by which it will choose to wage war."²⁰ First, space has become the key environment that makes our information-based economy run and billions of dollars are at stake. Secondly, space systems have become integral to the ability of the Department of Defense to prosecute successfully its responsibilities in support of the national security objectives of the United States. It is easy to extrapolate that space will be seen as vital interest to the U.S. It contains now and will continue to be populated with systems that are vital to U.S. security and economic prosperity. Hence, the U.S. will continue to view space like international waters and airspace, an area where it will want to have unimpeded access and freedom to operate.

The space threats outlined above can be divided into two separate categories. First, threats posed by enemy counter-space technologies, and second, threats from an enemy's force-enhancing space systems to U.S. terrestrial based forces. As international access to satellites grows, foreign skills in exploiting space and developing warfighting doctrines will also more than likely increase. Therefore, it is not hard to see that the U.S. will eventually want to be able to deny an enemy any advantage it may obtain from the use of their own or their allies' space systems as well as protect US and its allies use of

space system. Before we explore the question of "How?" it is imperative to review the U.S.' current policy.

UNITED STATES POLICY

The Clinton Administration's 1996 National Space Policy outlines broad policy goals and guidelines for space in the national security arena as well as civil, commercial, interagency, and international space activities.²¹ The policy dovetails nicely with current directions articulated in the National Security Strategy and National Military Strategy. These high-level policy and strategy documents hammer home that unimpeded access to, and use of space is essential for protecting U.S. national security. With regards to space control these documents state that the U.S. will deter and if necessary defeat threats to our space interests. Additionally, the U.S. will maintain the ability to counter space systems and services that could be used for hostile purposes.²²

While the Department of Defense Space Policy echoes the overall direction of the above mentioned policy and strategy documents it also includes a qualifier that constrains the requirement for unimpeded access and deterrence/defeat criterion. It includes the caveat that Department of Defense space activity shall comply with domestic and international law.²³

While there are a rather large number of space laws, only a few military activities are denied. Specifically, the Outer Space Treaty and Limited Test Ban Treaty restrict the testing and deploying of weapons of mass destruction (nuclear) or anti-ballistic missiles in space. States may not build military bases, installations, and fortifications; test weapons of any kind; or conduct military maneuvers on the moon and other celestial bodies. If a state plans an activity that could cause potentially harmful interference with the activities of other states, the state is obligated to consult with those states possible affected prior to initiating the activity. Conversely, if a state believes that an activity by another state may cause potentially harmful interference, it may request consultations. However, there is no requirement that the state planning the activity must agree to consultations. States must carry out their exploration and use of space in such a way as to avoid harmful contamination of the moon or other celestial bodies as well as to avoid the introduction of extraterrestrial matters that could adversely affect the environment of the earth.²⁴ These treaties do not limit the deployment of ASAT weapons or space-based weapons designed to strike terrestrial targets.

The 1972 Anti-Ballistic Missile (ABM) Treaty does not allow the development of space-based interceptors to strike strategic ballistic missiles (as distinct from theater ballistic missiles). Additionally, the 1972 the SALT I ABM Treaty ('72) and other nuclear weapon's treaties established protection of space-based "National Technical Means" that were used to provide warning of nuclear attack and supported treaty verification.²⁵ The bottom-line of the above-mentioned treaties are that, even with the stated restrictions, none of the treaties limit the deployment of ASATs or space-based weapons designed to strike terrestrial targets or theater ballistic missiles.

Finally, such documents as "Global Engagement: A Vision for the 21st Century Air Force," "Joint Vision 2010," and "USSPACECOM's Long-Range Plan (LRP)," also emphasize that globally accessible

space assets must be integrated into combat operations if the U.S. armed forces are to maintain their core competencies and achieve national security objectives. One key area that will ensure successful application of space assets is the ability to have a viable space control capability. The USSPACECOM LRP does an excellent job in summarizing how to achieve space control. The methods fall into three categories: Protection, Prevention and Negation.²⁶

The above-mentioned policy and strategy statements imply that the direction for space control is clear. In fact, the language appears to retain a full range of military options in space. The reality however, is that the methods for space control outlined in the USSPACECOM LRP engender the largest debate and subsequently the continuing struggle on how exactly the U.S. should proceed in this emerging and increasingly critical arena. As this debate proceeds, the U.S. policy for space control is primarily being interpreted and formed during executive and congressional budget actions.²⁷ At its core, is the discussion if weapons should be placed in space.

The debate ranges in both the realists' and idealists' camp. The logic of the realist can be synthesized to the belief that weapons in space are inevitable and that while the U.S. is becoming more dependent on space it would be foolish not to take advantage of its opportunity to be the first in the field to deploy them. On the other hand the idealists point out that if the U.S. embarks on fielding space borne weapons, while there is no real threat, it will be viewed by other states and citizens as unnecessarily provocative. Such a move could invoke a negative response from other nations and start an arms race that would sooner then later put at risk U.S. space systems. The idealists believe that the best measure of protection would be achieved through a combination of satellite protection measures (e.g., hardening and concealing) and pursuing additional treaties that limit the militarization of space.²⁸

Instead of allowing the current space policy to be dictated by budget actions both in the White House and Congress a clear space policy addressing acceptable activities to achieve space control is critical. Regardless of what side of the fence a person falls on with regards to how to realize space control this issue has to be addressed. The USSPACECOM LRP even went so far as to dedicate its second to last chapter, "Out of Our Lane," to summarize those policies, treaties, and agreements that need attention. Two of the nineteen areas USSPACECOM identified as needing attention deal with the space control problem set. The areas focus on establishing both international and U.S. policies defining space sovereignty. This entails everything from defining what is interference with a space system to what should be done about it.²⁹

MEETING THE CHALLENGE

There are two viable courses of actions (COAs) that could be pursued beyond the status quo of allowing space control be set during budget debates and actions by the executive and legislative branches. The first COA is to aggressively pursue a space sanctuary policy. This would entail worldwide diplomatic efforts to convince current and future space-faring nations that peaceful coexistence and stability will benefit all. As Lt Col DeBlois states in his article "Space Sanctuary – A Viable National Strategy", "Treaties must address exactly what constitutes a space weapon, commitments to not employ

them, mechanisms of verification/policing, and assurances of punitive response for violation."³⁰ More proactive steps to eliminate space system vulnerability to future threats can include, establishing responsive reconstitution capability as well as system redundancy (either space-based or terrestrial). Finally, other steps include developing effective camouflage, concealment, and deception techniques to counter foreign collection as well as security measures to deny access to critical communication nodes.³¹

The other COA is to pursue the development of national policies supporting space warfare, weapons development and employment and rules of engagement. This policy would also direct the development of proactive measures to decrease space system vulnerability as outlined above. The major drawback to actively pursuing space-based weapons is that, as stated previously, it has the potential of being seen as provocative and can have a destabilizing effect. Robert Bell, of the National Security Council Staff, stated,

We need not be victims to 'old think.' The old think Cold War mentality was that we envisioned space control as ASAT, and equated ASAT with a dedicated system that went up and destroyed something...revolutionary advances in technology, particularly in the area of information operations are so phenomenal that...we just need to widen our horizon.³²

Additionally, he stated that the Clinton Administration expressed confidence that the U.S. could defeat an adversary's threat through U.S. dominance of electronic warfare.³³ However, there are critics both in Congress and in the military on the tacit policy of not pursuing space weapons. Senator Bob Smith, Chairman of the Senate Armed Services subcommittee on strategic forces, stated, "I don't understand this position of destabilization. Why is it destabilizing to have a military capability in space to respond to an attack?"³⁴ Additionally, General Estes, CINCSPACE, stated, "Funding is necessary to assess the applicability of (space control) technologies to help us do space control as it develops over future years."³⁵

THE RIGHT CHOICE

Dr. Colin S. Gray and John B. Sheldon offered an impeccable argument for the necessity of a complete and coherent space power policy. They state: "The less than good news is that the distance between a powerful idea and ideas-as-capability can be measured in decades rather than years. It is important that the control of space is recognized today as a truly vital requirement of the US armed forces. The United States to date has deployed no forces to effect many elements of the space-control mission."³⁶

It would be nice to think that if the U.S. took the moral "high-ground" and adopted a policy of space-sanctuary, other nations would do likewise. Unfortunately, history has proven that technical advances, to include those in non-land environments (sea and air), were quickly utilized in the prosecution of warfare and doctrine quickly developed using all means available to obtain superiority in that particular environment. It is hard to imagine at this point in history that mankind will not embark on the same path it has traveled over the centuries. Therefore, it is prudent to take advantage of the U.S. technological advantage and opportunity to prepare for the inevitable and embark on the COA that develops and

employs space-based weapons supporting space control. As the SPACECOM LRP points out, the United States will need to develop national policies supporting space warfare. This includes all aspects of space control (e.g., assured access, surveillance, prevention, protection, as well as negation).³⁷ As stated before, such an action may be perceived as provocative and possibly start an arms race. This is highly probable. However, as current trends point out, other nations are already involved in this arms race by taking steps that would bolster their use and control of space. Space is still in its infancy of development but as the use of space continues to evolve it will more and more be viewed as equivalent to international airways or seaways of today. U.S. policy statements state that the U.S. must be able to apply a corresponding freedom of transit. Ultimately, ensuring freedom of navigation to the U.S. and its allies as well as providing space services will serve to add to U.S. stature abroad in support of national security objectives. Jim Oberg, in his book "Space Power Theory," laid out several benefits a nation can obtain by applying space power in several areas that comprise a nation's overall power: diplomatic, economic, and military. It can be used to: encourage and reward other nations; dissuade nations by terminating valuable joint space activities or services provided by space assets; project national influence by cultivating dependency thus controlling international discussions, projects and treaties; and lastly to apply force in, from and through space, and to resist force against oneself.³⁸

Few can argue with Mr. Oberg's assessment. These aspects of space power in essence synthesize what space can do for a nation. Are there ways to ensure the access to and use of space without having to use space-based weapons? The answer is, yes of course. By no means are space-based weapons the panacea that will give ultimate control of space. ASATs should be viewed as only part of the whole space control system.

This paper will not discuss in depth the diplomatic or economic instruments of power that a nation can bring to the fore to accomplish the space control mission. However, it is prudent to recognize that these are viable instruments. Like space-based weapons though, they cannot produce adequate results in and of themselves.

Aspects of space control can be accomplished on the diplomatic front. Applicable treaties can be pursued to limit or preclude the use of space-based weapons in addition to defining and limiting what constitutes interference with a nation's satellite systems. While these are viable options they do not guarantee that U.S. satellite systems will be protected. History has borne out that a nation will abide to treaties when it is in the interest of that nation and likewise will withdraw from a treaty for the same reason. There have also been numerous cases that nations will secretly violate a treaty while holding the other parties to the agreement. Additionally, it may not be in the U.S.' interest to have the same limitations imposed on the U.S. as the proliferation of space assets and capabilities throughout the world continues to grow and access is provided to not only space-faring nations but also rogue nations.

On the economic front, the U.S. may try to impose economic sanctions on nations that are either supplying space-based information (e.g., reconnaissance imagery) to an adversary or on a nation using its own space systems to interfere with U.S. space systems. This is also viable in some scenarios if the

threat or actual use economic sanctions is perceived as severely detrimental to the nation targeted. On the other hand, a target nation may find that the sanctions imposed may be acceptable considering the gain it is currently receiving or the economic gain it will receive in the future by providing information to another nation or interfering with U.S. space systems. Simply put, both diplomatic and economic tools can be useful and should be pursued but the military arm of national power also needs to exist and be credible.

As discussed earlier in the trends section of the paper, space systems have three segments: space, ground, and the communication link. Each segment has its own weakness in a combat environment. It is easy to understand that it may not be in the interest of the U.S. to target a satellite that is a threat. For example, the U.S. may be able to strike a satellite system because it is supplying a third country with intelligence. However, the U.S. may be unwilling to do so because it will negatively impact on negotiations with the same country that would ultimately provide a greater payoff. An example would be having a member of the United Nations Security Council either vote for, or at a minimum abstain from, a U.S. backed U.N. Security Resolution vote. It may be more advantageous to jam the satellite link or attack the ground segment itself. However, using the same rationale, jamming or attacking the ground segment by conventional and unconventional means may be too politically sensitive because of its location. To have a viable space control capability it must be capable and credible throughout the full spectrum of the space system. So defense against hostile satellites, either providing critical command control and intelligence capabilities to the enemy or threatening our own systems requires a system-like approach.

While space is unique, the Air Force's doctrine of gaining, if at all possible, air superiority first and using offensive and defensive counter air to achieve air superiority can be applied to a counter space doctrine. Offensive counter air operations are actions that include the attacking and enemy's command and control systems, enemy bases and launch facilities, as well as the surface-based air defense systems. It is the action of attacking the enemy's air power as close to the source (e.g., airfields) as possible. Defensive counter air missions concentrate on defeating the enemy's offensive plan by inflicting unacceptable losses on the enemy's air power and normally take place close to friendly territory. Defensive counter air includes air-to-air engagements as well as integrating surface-based capabilities.³⁹ Colonel John Warden, in his book "The Air Campaign – Planning For Combat" states, "... the most expensive place to take out enemy air is in the air."⁴⁰ He argues credibly throughout the book that the most difficult place to obtain air superiority is in the air. The alternatives offered are destroying aircraft on the ground, in the factories where they are made, or attacking the sites of raw material that goes into aircraft production. And while history has borne this assertion out, defensive counter air to include air-to-air combat has been and is still an essential part of air superiority doctrine. Logically this same approach can be applied to space.

Conventional military forces can be employed to deny an adversary access to space goods and services. The ground-based antennas, control centers, relay stations, and distribution nodes can be

targeted by familiar military tactics (e.g., bombing, cruise missile attack, special operation forces, etc.), as well as information operations. Additionally, the ultimate user could be targeted and attacked (e.g., headquarters). Ground attack aircraft, cruise missiles, or special operation forces can easily carry out this type of operation. As pointed out before, depending on the level of the conflict it may not be politically feasible to conduct this type of operation. The fact that satellites are in the medium of space offers some advantages. Since the destruction of a ground segment is by its nature a terrestrial act the images of the destruction can be easily displayed around the world and potentially have a negative effect. Jamming is another means to disrupt an adversary's use of satellite's but a jammer may not be able to be located close enough to the up- or down-link segment of the system. The same logic can be applied to the use of a ground-based laser. While a ground-based laser would be very effective, if located in the proper place, to engage most low earth orbit satellites it may not be able to engage a specific satellite that is deemed an appropriate target (e.g., in a geo-synchronous orbit). Additionally, the ground-based laser is also susceptible to weather conditions. It may not be in the interest of the U.S. to wait for a protracted amount of time for a storm front to pass or a satellite to pass overhead.⁴¹ These problems are especially problematic with regards to the U.S., where the employment of U.S. force is more likely to be used outside the continental U.S.

This brings us to the point where the most advantageous and desirable way to neutralize an adversary's space-based capability, either as a show of resolve or to deny the enemy the use of space-based information, may be to directly target a satellite. A single action against one satellite can send a powerful signal to a belligerent it shows the ability and resolve to respond rapidly to a threat or action. It also negates possibilities of loss of human life as well as any visual transmission of the military action that could adversely affect U.S. goals. This scenario is not only the sole domain of the U.S. If an adversary decides to attack a U.S. satellite for the same reasons outlined above, it may not be in the interest of the U.S. to attack a terrestrial target in response. However, the ability to selectively engage and neutralize the offender's satellites or one of its allies can rapidly show resolve and deny the adversary of critical space-based support. This action, combined with other initiatives that allow rapid and inexpensive reconstitution of space assets, give the U.S. the means to dominate the space control problem set⁴².

Many can argue that while space ultimately will be weaponized, the fact that the U.S., for all intents and purposes, has space hegemony dictates that the U.S. takes all action to slow the weaponization of space since it has the most to lose. The more prudent approach is to look for "triggers" that would dictate that the U.S. undertake the development and deployment of space-based space control weapons ensuring that it will not be caught by surprise by an adversary. For example, do other nations have an organic space program that allows it to perform sophisticated space missions (e.g., putting astronauts in space)? Do some countries show signs of developing either terrestrial or space-based space control technology? Are nations demonstrating an understanding and willingness to engage the U.S. in an asymmetric way? It is prudent to look at existing threats as well as the trends to determine if the triggers haven't already been pulled.

POSSIBLE THREAT

As alluded to before, in addition to the U.S. use of space in the defense and commercial arena foreign powers – both allies and potential foes are also actively pursuing space as a medium for economic prosperity and military enhancement. In Secretary of Defense William Cohen's "1999 Annual Report to the President and Congress" he states

Numerous countries in regions around the world are acquiring or accessing space systems, technologies, and products. Foreign nations and sub national groups are obtaining space capabilities through indigenous efforts, purchases of goods and services, and cooperative activities. The spread of indigenous military and intelligence space systems, civil space systems with military and intelligence utility, and commercial space services with military and intelligence applications poses a significant challenge to U.S. strategy and military operations⁴³

As described above, there is plenty of evidence that supports Secretary Cohen's assessment and it all points to the fact that there is a growing threat to U.S. government and commercial space-based systems. As has always been the case, the U.S. armed forces must be prepared to defend this nations interest and if deterrence fails fight and win this nations wars.

The Institute of National Strategic Studies stated in their "1998 Strategic Assessment – Engaging Power for Peace" that the three major economic powers in the world are the U.S., the European Union, and Japan and that there is generally a very positive security environment between these actors. The three largest countries outside this core are Russia, China, and India, and they are attempting economic reform and integration. The Chinese and Indian economies are projected to be ranked third and fourth in the world by this year (2000). While the U.S. welcomes the success and integration of these states into the world economy, the U.S. must be prepared to thwart any aggressive tendencies exhibited by these states.⁴⁴ While it is not the intention of this article to predict who the U.S. will have either low-level or total conflict with, it is helpful to look at one of the countries outlined in the Strategic Assessment, China, to determine if in fact it is in the interest of the U.S. to pursue ASATs in its space control mission.

China is the most important transition state due to its size and human potential. However, China's growing power and resolve to reunify Taiwan with the mainland increases the likelihood of friction or outright conflict with the U.S. Additionally, China's gradual growth in power-projection capabilities will unsettle regional security and demand U.S. attention.⁴⁵ The power projection capability of China was given greater credibility recently in a Washington Post article that cited comments from the commander of China's air force made to the New China News Agency. Lieutenant General Liu Shunyao said the air force will strive to "realize as soon as possible a change from territorial defense to a combination of defense and offense." The Chinese navy has also said it will move from being a coastal defense force to one that can use its military power away from home.⁴⁶

As was pointed out earlier in the article, China has been involved in space launches and development for years. It has deployed its own spy satellites and is one of a few nations that has its own organic space-lift capability.⁴⁷ Most recently, China has been taking steps to put itself in the upper echelon of the space industry. In mid-1999 a high-ranking Russian official confirmed the possibility that Russia will aid

the Chinese in developing its ability to put a human in space. Photos on the Internet that supposedly show the first Chinese manned launch vehicle are almost identical to the Russian Soyuz spacecraft. Reportedly the Chinese are also developing a space station similar to the Mir orbital lab.⁴⁸ Shortly after this report, in late November 1999, China announced that it successfully launched its first unmanned space vehicle that orbited the earth 14 times in 21 hours before landing in Inner Mongolia. This accomplishment makes China only the third country in the world to launch space technology capable of supporting manned space operations.⁴⁹ During the same timeframe, China also offered to launch India's latest telecommunication's satellites. This offer could possibly end India's reliance on the U.S. and the European conglomerate Arianespace thus giving India greater flexibility in launch scheduling and lowering costs.⁵⁰

With China's growing use and development of space, both in the military and economic sector, how does China view space warfare? According to Dr. Michael Pillsbury, an Associate Fellow at the Institute for National Strategic Studies, National Defense University, space warfare is an area of continuing debate. Several in the PLA view space warfare as essential to the outcome of future wars while others don't view it as that important. Many have grave concern over China's overall weakness in space and have aggressively promoted a "space warfare headquarters" to monitor and direct anti-satellite and missile defense operations. More conservative Chinese officers agree that ASATs and space warfare is important to future warfare but emphasize the requirement for a more robust launch capability and defensive measures/tactics against ASATs themselves.⁵¹ A declassified U.S. Department of Defense report released in November of 1998 highlighted a specific development that may shed some light on Chinese intentions in the area of space warfare. The report stated that China may be developing and building a terrestrial based anti-satellite laser, possibly with help from scientist from the former Soviet Union, which ultimately could be targeted against U.S. intelligence and reconnaissance and communications satellites. While the report concedes that the laser is probably years away from actual fielding the fact that the Chinese are developing it in the first place is of great concern. Additionally, the Chinese have been seeking ways to counter the U.S. technological advantage they saw first hand during Operation DESERT STORM and they have identified the U.S.' space assets as a "strategic center of gravity."⁵² While it does not appear that China will have an active space-control threat within the immediate future, the indication is that the Chinese are taking the appropriate steps to seriously develop this capability.

While not on the "space front," several other Chinese views on the how to wage war have come to light recently. Senior members of the People's Liberation Army (PLA) are openly planning for and urging the Chinese government to increase its spending and military doctrine development in the asymmetric realm. They espouse the belief that terrorism, biochemical warfare, environmental damage, and computer viruses are a more realistic approach to fighting the U.S. and its allies who have demonstrated conventional military superiority. The articles and books written by the PLA officers state the war of the future will be waged on all fronts to include classic non-military arenas (e.g., attacking public and financial

institutes).⁵³ The rationale for highlighting the last two points along with the other developments outlined above is to make clear that no matter how much the U.S. tries to draw China into the world community, China will continue to develop its own capabilities to undermine, or at a minimum degrade U.S. foreign policy goals in the Far East while strengthening its own.

As stated earlier, the last assessment of China's military and space capabilities and development is not intended to indicate that China will be the next country the U.S. will have a conflict with. It would have been just as easy to examine Russia. Russia is always a concern, they continue to have a robust space program that have an ability to monitor U.S. forces. Ever if the reason for open conflict with the U.S. has diminished, Russia still is able to give support to other states that would directly or indirectly challenge U.S. interests. This threat alone is a complicating factor when dealing with rogue nations that may be able to receive support from a multitude of sources (e.g., Russia, China, and/or international corporations.

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The evidence above demonstrates that the world is evolving and the use and control of space is not only recognized by other nations but there are actions taking place that will eventually challenge the U.S. in the space superiority realm.

CONCLUSION

The U.S. must to take advantage of this time of conflict pause and prepare before for the inevitable time when a nation either attacks or deploys a capability that can either destroy or neutralize a U.S. space asset. Or potentially as damaging, being able to glean enough information or capability to put the U.S. terrestrial forces at risk. There is no doubt that it would be good for mankind if the U.S. and all nations and non-state organizations could agree to the non-weaponization of space. Similar wishes for other technological advances in the past have also occurred. Secretary of War Woodring, in 1938, stated he hoped:

That there may be advanced at the conference tables of the future international agreements completely stripping aircraft of all armament and death-dealing devices—yes, the complete outlawry of the plane as an instrument of war. What a long humanitarian stride would be taken could world-wide agreement be reached demanding that the plane be employed only as means of commercial intercourse! What a load lifted from the shoulders of a fearful world!"⁵⁵

While this is a noble ideal for the time it would have been naïve to believe this was an attainable goal. In less than a year Germany launched its famous Blitzkrieg attack on Poland effectively combining Luftwaffe airpower with its ground troops to achieve a decisive victory. The use of space is at a similar crossroads. Space- and terrestrial-based weapons and capabilities are being developed for the ultimate control of space. The beginning of space warfare is being theorized in the U.S. as well as in other nations. It is clearly only a matter of time when weapons are fielded in space.

A coherent defense space policy is clearly one of the most important policies the U.S. can have in the 21st century. Unfortunately the current space control policy is still being developed through budget actions and debate while no clear direction is provided from the National Command Authority. It is time to

clearly articulate the U.S.' space control policy/strategy. And this strategy should include the use of space-based weapons. As stated earlier, it takes time to develop, deploy, and effectively use new systems. To obtain an effective space control capability all element of an enemy's space system must be put at risk, thus allowing the flexibility of different actions, both militarily and diplomatically, to ensure U.S. access and deny an adversary's use of space. Depending on the scenario, terrestrial- or space-based anti-satellite weapons will not always be necessary to deny an adversary the use of space. But the ability to use this capability is truly the only way to realize the direction of our national security policy documents to have and retain "space superiority." As more nations expand commercially and militarily into space, space superiority will rapidly be the element of military power that will dictate victory or defeat in future wars.

(Word Count: 7,410)

ENDNOTES

¹ Many articles and publications espouse how space is growing in its criticality to both economic and military dependence and cite numerous trends and historical anecdotes on the evolution of space systems and their use: Dr Colin S. Gray, "Space Power Survivability," Airpower Journal (Winter 1993); James W. Cannan, "Space Support for the Shooting Wars," Air Force Magazine (April 1993); John T. Corell, "Command of Space," Air Force Magazine (October 1996); Donald B. Rice, Global Reach, Global Power: the Evolving Air Force Contribution to National Security (Washington D.C.: Department of the Air Force, 1992); Joint Vision 2010 (Washington D.C.: Chairman of the Joint Chiefs of Staff, 1996); Steven Lambakis, "Exploiting Space Control," Armed Forces Journal International (June 1997); Gen Thomas S Moorman Jr., "The Explosion of Commercial Space and the Implications for National Security," Air Power Journal (Spring 1999); and Benjamin S. Lambeth "The Synergy of Air and Space," RAND Reprints, (RAND 1998).

² Paul B. Stares, The Militarization of Space: US Policy, 1945-84 (Ithaca, New York: Cornell University Press, 1985), 22-91.

³ James E. Oberg, Space Power Theory (Government Printing Office, 1999), 48-66.

⁴ Stares, 106-215.

⁵ James W. Canan, "Space Support for the Shooting Wars," Air Force Magazine (April 1993), 31.

⁶ *Ibid.*, 30-34.

⁷ Dr. Colin S. Gray, "Space Power Survivability," Air Power Journal (Winter 1993), 27.

⁸ Gen Michael E. Ryan, "Visions and Views," The Retired Officer Magazine (January 2000) 58.

⁹ Richard J. Newman, "The New Space Race," U.S. News and World Report (November 8, 1999) 30, available from <<http://ebird.dtic.mil/Nov1999/e19991101space.htm>>. Internet. Accessed 10 November 1999.

¹⁰ National Defense Panel, Transforming Defense: National Security in the 21st Century, (Washington, D.C., The White House, December 1997), 38.

¹¹ Gen Thomas S. Moorman Jr., "The Explosion of Commercial Space and the Implications for National Security," Airpower Journal (Spring 1999), 11.

¹² *Ibid.*, 10.

¹³ Oberg, 17-21.

¹⁴ Moorman, 10-14.

¹⁵ There are several articles that address the spaced-based remote sensing business. The information derived came from two articles: Jason Bates, "Remote Sensing: At Long Last, Imagery Business Takes Off," Aviation Week's Space Business (October 4, 1999), 26; and Gen Thomas S. Moorman Jr., "The Explosion of Commercial Space and the Implications for National Security," Airpower Journal (Spring 1999), 14-17.

¹⁶ The proliferation of space based, new technology threats is covered in the Air Force's futures studies: New World Vistas: Air and Space Power for the 21st Century (United States Air Force Scientific Advisory Board, 1995); and Air Force 2025 (Maxwell AFB, AL: Air University, 1996). Additionally there are several current articles that outline the current trend of developing technologies that could be used not only by mature space faring nations but also low end adversaries: Paul Richter, "China May Seek Satellite Laser, Pentagon Warns," The Los Angeles Times; Los Angeles, CA (November 28, 1998); Mark Mateski, "Managing ASATs: The Threat to US Space," Jane's Intelligence Review (May 1999); and John T. Correll, "USAF Space Almanac," Air Force Magazine (August 1999).

¹⁷ National Air Intelligence Center, "Threat to US Military Access to Space," Course 4, Implementing National Military Strategy, Selected Readings, Volume IV, Academic Year 2000, (U.S. Army War College, Carlisle Barracks, PA 17013-5050) 24-60 – 24-69.

¹⁸ New World Vista: Air and Space Power for the 21st Century, Summary Volume, (United States Air Force Scientific Advisory Board, 1995), 46.

¹⁹ Mark Mateski, "Managing ASATs: the Threat to US Space," Jane's Intelligence Review, (May 1999), 50-52.

²⁰ Tofler, Alvin and Heidi, War and Anti-War, (Little, Brown and Company, 1993), 3.

²¹ National Space Policy, (Office of the White House Press Secretary, 19 September 1996); available from <<http://www.fas.org/spp/military/docops/national/nstc-8.htm>>; Internet; accessed, 19 September 1999.

²² William J. Clinton, A National Security Strategy for a New Century (Washington, D.C.: The White House, October 1998), 25-26; and GEN 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.: Chairman of the Joint Chiefs of Staff, 1997), 29.

²³ William Cohen, Department of Defense Space Policy (Washington, D.C.: Secretary of Defense, 9 July 1999); available from <<http://www.fas.org/spp/military/docops/defense/d310010p.htm>>; Internet; accessed, 19 September 1999.

²⁴ "Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, October 10, 1967," United States Treaties and Other International Agreements, Vol 18, Part 3, 1967 (U.S. Government Printing Office, Washington: 1969), 2410-2421; "Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water, October 10, 1963," United States Treaties and Other International Agreements, Vol 14, Part 2, 1963 (U.S. Government Printing Office, Washington: 1974), 1313-1319.

²⁵ "Limitation of Anti-Ballistic Missile Systems Treaty, October 3, 1972," United States Treaties and Other International Agreements, Vol 23, Part 4, 1972 (U.S. Government Printing Office, Washington: 1973), 3435-3446

²⁶ USSPACECOM, Long Range Plan: Implementing USSPACECOM Vision for 2020, (Peterson AFB, CO: US Space Command, March 98), 21: The LRP clearly defines each of the space control methods. Protection requires warning of possible threats and the ability to harden against and/or move space assets from attack. Prevention denies an adversary from exploiting U.S. or allied space capabilities by any means short of military force, including political, informational. Negation is the

application of military force to affect an adversary's space capability by targeting ground-support sites, ground-to-space links, or spacecraft.

²⁷ Over the last few years the funding of key Military Space Programs is continually at odds between the Clinton Administration and Congress. The most contentious issues deal with the costs weighed against the perceived threat for space control negation (ASATS), space based missile defense, as well as assured access (space plane): William B. Scott, "Clinton Team Defends Killing Milspace Programs," Aviation Week & Space Technology (April 20, 1998); Stewart M. Powell, "Bell at the White House," Air Force Magazine (February 1999); and William B. Scott, "U.S. Adopts 'Tactical' Space Control Policy," Aviation Week & Space Technology (March 29, 1999).

²⁸ Lt Col Bruce M. DeBlois "Space Sanctuary – A Viable National Strategy", Air Power Journal (Winter 98). Much of this section is derived from Lt Col DeBlois' article. Even though he supports the space sanctuary doctrine, he does a good job of clearly outlining the arguments on both sides of the issue.

²⁹ USSPACECOM, Long Range Plan: Implementing USSPACECOM Vision for 2020 (Peterson AFB, CO: US Space Command, March 98), 137-139

³⁰ DeBlois, 53.

³¹ *Ibid.*, 53-54.

³² Stewart M. Powell, "Bell at the White House," Air Force Magazine (February 1999), 41-42.

³³ *Ibid.*, 41.

³⁴ William B. Scott, "U.S. Adopts 'Tactical' Space Control Policy," Aviation Week & Space Technology (March 29, 1999), 35.

³⁵ William B. Scott, "Clinton Team Defends Killing Milspace Programs," Aviation Week & Space Technology (April 20, 1998), 30.

³⁶ Gray, Dr. Colin S. and Sheldon, John B., "Space Power and the Revolution in Military Affairs: A Glass Half Full?," Airpower Journal, (Fall 1999): pg 23.

³⁷ USSPACECOM, 21 & 73.

³⁸ Oberg, 47-48.

³⁹ Gen Michael E. Ryan, Air Force Doctrine Document 1 (September 1997), 46-47.

⁴⁰ John A. Warden III, The Air Campaign – Planning For Combat (Washington, D.C.: National Defense University Press, 1988), 99.

⁴¹ Lt Col Robert H. Zielinski et al., "Star Tek—Exploiting the Final Frontier: Counterspace Operations in 2025," Air Force 2025 (Maxwell AFB, AL: Air University, 1996), 42-44.

⁴² Several articles and testimonies point to initiatives that help ensure space superiority for the U.S. They range in the area of: strengthening space programs through partnerships between the National Reconnaissance Office, the Air Force, and the National Aeronautics and Space Administration;

leveraging advances in the commercial space industry to lower costs and improve the capabilities of satellite systems; and conducting research on ways to protect space assets. One of the enduring initiatives over the last decade is developing ways to mass-produce satellites and reducing launch costs. The Evolved Expendable Launch Vehicle program is at the forefront. The information derived came from: Keith R. Hall, Assistant Secretary of the Air Force (Space) and Director, National Reconnaissance, Statement on U.S. Spacepower in the 21st Century, before the House Science Committee Space and Aeronautics Subcommittee, House National Security Committee Military Research and Development Subcommittee, and House National Security Committee Military Procurement Subcommittee (29 September 1998); available from <<http://www.nro.odci.gov/speeches/29SepSFR.html>>; Internet; accessed 21 Nov 99; and Gen Richard B. Meyers, "Integrating Space in an Uncertain Era," Speech given at an Air Force Association Meeting in Los Angeles, CA, (November 13, 1998); available from <<http://www.spacecom.af.mil/usspace/Speech11.htm>>; Internet; accessed 21 Nov 99.

⁴³ William Cohen, Annual Report to the President and the Congress (Washington, D.C.: Department of Defense, 1999), 86.

⁴⁴ Institute for Nation Strategic Studies, 1998 Strategic Assessment – Engaging Power for Peace (Government Printing Office, 1998), 1, 4, & 12.

⁴⁵ *Ibid.*, 12.

⁴⁶ John Pomfret, "China Plans for a Stronger Air Force; Move Reflects push to Expand Influence in Asia, Serve Notice to United States," Washington Post, (November 9, 1999), A17.

⁴⁷ In a recent South China Morning Post article, dated 6 October 1999, China was reported to have 17 spy satellites that could "continuously monitor US military and which could also be used to guide a "saturated" missile attack..." against Taiwanese and U.S. forces.

⁴⁸ Anatoly Zak, "Russians May Help China Put Person into Space," Space.com, news:international, (October 18, 1999); available from <http://www.space.com/news/international/china_Russia_991018.html>; Internet; accessed January 22, 2000.

⁴⁹ Ellen Sung, "U.S. Braces for Impact of Chinese Space Launch," Policy.com, News & Events: Daily Briefing (November 18, 1999); available from <<http://www.policy.com/news/dbrief/dbriefarc412.asp>>; Internet; accessed January 22, 2000.

⁵⁰ Daniel Sorid, "China's Offer Opens India's Launch Options," Space.com, news:international, (November 19, 1999); available from, <http://www.space.com/news/international/china_indialaunch_9911118.html>; Internet; accessed January 22, 2000.

⁵¹ Dr. Michael Pillsbury, The Chinese Armed Forces in the 21st Century (Strategic Studies Institute, U.S. Army War College, Carlisle, PA, December 1999), 128-129.

⁵² Paul Richter, "China My Seek Satellite Laser, Pentagon Warns," Los Angeles Times (November 28, 1998).

⁵³ David Harrison and Damien McElroy, "China's Military Plots 'Dirty War' Against the West," London Sunday Telegraph (October 17, 1999); available from <<http://ebird.dtic.mil/Oct1999/e19991018derty.htm>>; Internet; accessed October 19, 1999.

⁵⁴ For a complete rundown on Russia's space capabilities and issues recommend reading the following: Peter Hays, eds., Space Power Interests (Westview Press, Boulder, CO, 1996); Matthew J. Von Bencke, The Politics of Space: A History of U.S.-Soviet/Russian Competition and Cooperation in Space (Westview Press, Boulder, CO, 1997); and James E. Oberg, Space Power Theory (Government Printing Office, 1999). Additionally, the 1998 Strategic Assessment points to Russia, as well as China and other space capable nations supporting rogue nations either as a state or through international corporations.

⁵⁵ Army and Navy Journal Excerpts, "Would Ban War Planes," (October 15, 1938). Armed Forces Journal International (December 1999): 48.

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