Charting a Course for Improved U.S. Space Security

Written Testimony
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Introduction

I thank the chairman, members of the subcommittee, and its professional staff for the opportunity to present written testimony on means for improving the security of U.S. activities in space and on issues related to the 2006 U.S. National Space Policy. I have studied these problems for some 20 years, have published many articles and other studies on these questions,[1] and have recently completed a book manuscript entitled *The Politics of Space Security, 1957-2007.* I have also spoken at dozens of recent, space-related conferences at the United Nations, the Conference on Disarmament, the U.S. Air Force Academy, and at other national and international venues, including a recent meeting on "Asian Views of Space Security" in Tokyo, Japan.[2] Information I have presented at some of these events and in my publications is encapsulated in this testimony. Overall, I will make the case that space security is too often mischaracterized as a "military security" issue. Instead, as orbital debris from China's recent anti-satellite (ASAT) test highlights (and as will be discussed further below), threats to U.S. space assets are more accurately viewed as more of an "environmental security" problem.

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[1] For a few, easily accessible online publications by the author, see: "Space Conflict or Space Cooperation?" on the CNS website at: http://www.cns.miis.edu/pubs/week/060126.htm; the edited collection "New Challenges in Missile Proliferation, Missile Defense, and Space Security" on the CNS website at: http://www.cns.miis.edu/pubs/opapers/op12/index.htm; "Space Security and Bush Administration Policy: Results of the First Term" on the Nuclear Threat Initiative website at: http://www.nti.org/e_research/e3_44a.html; the edited collection "Future Security in Space: Commercial, Military, and Arms Control Trade-Offs" on the CNS website at: http://www.cns.miis.edu/pubs/opapers/op12/index.htm; and "Breaking the Deadlock on Space Arms Control" on the *Arms Control Today* website at: http://www.armscontrol.org/act/2002_04/moltzapril02.asp. For detailed background information on a range of national space programs and their perspectives on space security, see the "Current and Future Space Security" section of the CNS website at: http://www.cns.miis.edu/research/space/index.htm.

[2] For a report on this meeting, see "Asian Approaches to Space Security," on the CNS website at: http://www.cns.miis.edu/pubs/week/070510.htm.

Framing the Problem

China's anti-satellite test in January 2007 called renewed attention to the fundamental *interdependence* of all activities in space. Unfortunately, the physics of space and the dynamics of orbital objects (traveling at speeds averaging 18,000 mph) create conditions of mutual risk and shared security, particularly in crowded orbits close to the Earth. China's single test released an estimated 35,000 pieces of large and small orbital debris, much of which will take several decades to descend far enough to be burned up by the Earth's atmosphere. Thus, whether we like it or not, what China, the European Space Agency, India, Russia, and others—including non-state and commercial actors—do in space will have an important impact on future U.S. space security. By the same token, what the United States does in space will affect all other actors as well. For these reason, unilateral approaches to space security—while perhaps appealing for the seeming "independence" they offers—are singularly ineffective strategies to pursue. Indeed, such a U.S. approach would ultimately prove highly *counterproductive* for our space security interests.

Instead, improving security in space will require establishing an international consensus among major space actors on what kinds of activities should be allowed in orbit, and what activities should be prohibited. With this in mind, the real question boils down to how the United States should use its current advantages in space, its broad international influence, and the power of its arguments to help shape the future environment in space to one that will *minimize* threats and *maximize* U.S. capabilities to develop space for civilian, commercial, and military support activities. First and foremost, this is an environmental question, since man-made radiation and debris can ruin space for all users.

A Brief Look Backward

We need only look back on the history of U.S.-Soviet rivalry in space to understand why the United States rejected unilateralism as an approach to space security very early in the space age under President John F. Kennedy. Beginning with U.S. nuclear tests in space in 1958, the two superpowers carried out a total of nine nuclear explosions in low-Earth orbit[3] (and many others in the upper atmosphere) by 1962. However, even space weapons enthusiasts in the two side's respective weapons laboratories and militaries began to notice the harmful effect of electro-magnetic pulse radiation (EMP) generated by these tests on their own space assets. One U.S. nuclear test (Starfish Prime) in July 1962 alone disabled at least six U.S., Soviet, and British satellites and threatened pending U.S. and Soviet manned missions. In order to prevent the ruination of low-Earth orbit by EMP, the two sides (joined by the United Kingdom) signaled their intention to ban further nuclear tests in space by signing the Partial Test Ban Treaty (PTBT) in 1963. Still, some members of Congress voiced their opposition to the treaty when it went before the Senate in August 1963, fearing that giving up such tests might jeopardize U.S. military space capabilities. However, as General Curtis

[3] Low-Earth orbit is the region from approximately 60 to 500 miles above the Earth.

LeMay stated in response to a senator's suggestion that the treaty gave up critical U.S. military options:

> No, sir; I think I must disagree with you there. We have a broader duty, I think, to the country than just considering military questions.... We must consider political factors in the solution of our military problems, because they are important, and they do have a bearing on our solutions.[4]

General LeMay's words continue to ring true today. Since the PTBT, notably, no nuclear weapons have been tested in space.

Despite the history of military space restraint during the Cold War, some recent military analysts and officials have attempted to portray the evolution of military space capabilities as purely *technologically* determined, pointing to the development of scientific, commercial, and then military technologies in the world's oceans and airspace. Drawing on the theories of Alfred Thayer Mahan and Guilo Douhet, they have made the case that space weapons are "inevitable," glossing over major differences in space compared to the sea and air, including the danger posed by orbital debris. But, as nuclear strategist Herman Kahn cautioned back in 1960:

> It is very easy to make the obvious Mahan analogy on "control of the sea" and talk blithely and superficially of "control of space." The analogy was never really accurate even for control of the air, and [...] it seems to be completely misleading for space.[5]

Fortunately, while both Washington and Moscow carried out "hedging" strategies for possible anti-ballistic missile defense in space and for ASAT capabilities, both refrained from engaging in attempted "space control" strategies at the expense of the other side and successfully resisting the supposed "historical inevitability" of space warfare

While the Soviet Union conducted some 20 tests of a conventional, co-orbital ASAT system from 1968-82 (some of which generated debris) and the United States conducted one debris-producing test of a direct-ascent ASAT missile launched from an F-15 in 1985, the two sides rejected deployment of space-based systems and, after 1985, stopped further debris-generating ASAT tests completely. Put simply, the two sides learned from experience that the physics of space made it an area uniquely *unsuited* for such kinetic-kill and explosive tests, which threatened to clutter up critical low-Earth orbits and make them unusable for a range of scientific, commercial, and military support activities. Although some Air Force officials continue to discuss such weapons for satellite defense, Air Force Undersecretary for Space Programs Gary Payton argues: "We'd be fools to actually get into the kinetic energy anti-satellite business."[6]

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[4] Gen. LeMay quoted in Glenn T. Seaborg, *Kennedy, Khrushchev, and the Test Ban* (Berkeley, CA: University of California Press, 1981), p. 271.
[5] Herman Kahn, *On Thermonuclear War* (Princeton, NJ: Princeton University Press, 1960), p. 486.
[6] Quoted in Jeremy Singer, "USAF Interest in Lasers Triggers Concerns About Anti-Satellite Weapons," *Space News*, May 1, 2006, p. A4.

Unfortunately, due in part to the absence of space security talks with the Chinese for the past decade (a policy begun under the Clinton administration), Beijing failed to learn the lessons internalized in the U.S.-Russian space relationship. Instead, given U.S. unwillingness to strengthen collective security mechanisms in space, it decided to begin its own "hedging" policy for the development of a limited military space capability.[7]

Addressing Threats in Military Space

Although the United States still leads all other countries by a wide margin, foreign military space activities are becoming steadily more pervasive and more sophisticated. Besides China, India has in the past mentioned its research into space weapons, and Russia has considerable latent capabilities. Moreover, numerous countries now operate military reconnaissance satellites. In the absence of new space security agreements, the deployment of space-based weapons and more testing of additional ground- and air-based systems (following on current U.S. plans and the unwillingness of China and possible other countries to be left behind) is certainly possible in the coming 10 to 20 years.

However, space is also populated by a growing number of non-military actors, including meteorological, communications, remote sensing, global positioning, and commercial satellites, as well as the *International Space Station*. By 2009, Virgin Galactic plans to begin sub-orbital flights of ordinary (if wealthy) civilian passengers and Bigelow Industries plans to offer trips to orbital space stations by 2010. Whether or not these dates slip is not the point. What matters is that there will be a growing number of people in low-Earth orbit who could be harmed by weapons-testing and the related generation of orbital debris.

Ironically, when supporters of space weapons discuss the "demand" for such systems, their main point of evidence is the vulnerability of orbital systems to attack. Yet, the actual "weakest links" in military space systems remain largely on the ground (in addition to uplinks and downlinks to ground stations), since space-to-space weapons have not yet been deployed and ground-based ASAT systems remain dependent on direct overflight (and vulnerable to possible evasive or cloaking maneuvers by targeted satellites). In this context, some experts have raised the possibility that "non-offensive" defenses (decoys, spares, maneuvering capability, etc.) could play a key role in *reducing* national space vulnerabilities and paving the way for possible new arms control cooperation. Indeed, the U.S. military is known to be working on a variety of technologies in this area, as well as other, active non-destructive technologies (such as jamming). As Phillip Baines notes:

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[7] As Chinese People's Liberation Army Air Force Lt. Col. Zhong Jing emphasized in prepared remarks at the conference on "Collective Security in Space: Asian Perspectives on Acceptable Approaches," in Tokyo, Japan, April 23-24, 2007, China conducted its ASAT test in January 2007 because it needed to develop a "limited defense capability" until such time as the United States agreed to new arms control measures in space.

> Examples of denial and deception, hardening and shielding, electronic attack and protection, redundancy and reconstitution, and dispersion and deployment decisions are all in evidence in existing space systems to meet the challenge of the current threat environment.[8]

Within the Pentagon, the new code-word for space security is so-called "operationally responsive" space capability. This term refers to efforts to reduce reliance on single spacecraft for critical military support functions and to develop the ability to quickly replace any significant assets that might be damaged or destroyed in a time of war. This strategy is believed by its supporters to be more effective, more sustainable, more cost effective, and less likely to generate hostile foreign reactions than previous concepts of "space dominance."

If evasive and other non-destructive methods for possible defense (and, when necessary, non-destructive interference) could become the norm and be promoted by the United States, more formal mechanisms to codify such military space restraint might later be possible. This could protect space from the otherwise likely implications of space weapons testing and deployment. But much will depend on whether cooperation in the space security field can be established among major actors (such as the United States and China).

Unfortunately, recent U.S. space policy has placed it in direct opposition to virtually all countries in terms of international management of collective space problems. Drawing on such diverse documents as the 1998 Rumsfeld Commission Report on Missile Proliferation, the 1999 Cox Commission Report on China, and the 2001 Rumsfeld Commission Report on U.S. Space Management, the Bush administration adopted a less cooperative approach toward space security, rejecting policies of international engagement and emphasizing military responses for "defeating" space threats. Early administration speeches and military reports bristled with such concepts as "space dominance" and "space control" and exotic space weapons, such as "Rods from God." U.S. withdrawal from the Anti-Ballistic Missile Treaty in 2002 put all other countries on notice that prior policies of U.S. military space restraint could no longer be expected. The Congress complied with repeated, large increases in the missile defense budget, which included research on a variety of space-based systems (including the Space-Based Laser) and funds for testing interceptors in low-Earth orbit. The "lessons" of this experience were not lost on other states, which began to consider space warfare as the logical fulfillment of U.S. policies.

The official issuance of the revised U.S. National Space Policy in October 2006[9] reiterated the Bush administration's refusal to consider new treaties as a means for

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[8] Phillip J. Baines, "Prospects for 'Non-Offensive' Defenses in Space," in James Clay Moltz, ed., "New Challenges in Missile Proliferation, Missile Defense, and Space Security," CNS Occasional Paper #12, available online at: http://www.cns.miis.edu/pubs/opapers/op12/index.htm, p. 47.

[9] See the full text of the "U.S. National Space Policy" (unclassified version), available on the website of the White House Office of Science and Technology Policy at: http://ostp.gov/html/US%20National%20Space%20Policy.pdf.

enhancing space security. It asserted the U.S. right of free access to space, but stated the U.S. right to "deny such freedom of action to adversaries," despite the political ramifications. Rather than considering multilateral cooperation, it emphasized a unilateral goal of U.S. "space control." Many domestic and almost all foreign observers (including U.S. NATO allies) viewed the administration's repudiation of cooperative security approaches as harmful to future space security, leading to considerable criticism. The one exception to the administration's non-engagement policy in space security was debris mitigation, where the Bush administration supported voluntary efforts through the UN Committee on the Peaceful Uses of Outer Space (COPUOS) to adopt international debris guidelines.

At the United Nations, unfortunately, the United States has followed policies since 2005 that have made it a veritable "pariah" among space-faring states (and others). The Bush administration has the dubious distinction of casting the only votes ever against the perennial UN resolution on the Prevention of an Arms Race in Outer Space. Washington also has cast the only two "No" votes against the 2005 and 2006 Russian-sponsored space resolution calling for greater transparency and enhanced confidence-building measures in space activities. Despite Washington's belief in its largely "defensive" intentions space, to the rest of the world, the United States is seen as having an "offensive" orientation, since it has been the main obstacle to expanded international cooperation for space security.

In the aftermath of the Chinese ASAT test, surprisingly, U.S. Ambassador to the Conference on Disarmament Christina Rocca indicated no change in U.S. space security policy. Ambassador Rocca argued: "Despite the ASAT test, we continue to believe that there is no arms race in space, and therefore no problem for arms control to solve."[10] The United States remains alone in this view.

Space weapons are costly, unproven, and replete with harmful side effects. Moreover, current administration arguments have not caused the American public to clamor for a new "Star Wars." Since the Chinese ASAT test, the commercial space industry has clearly broken with the policy of the current U.S. administration in urging stronger international controls against future such tests. An editorial in the normally pro-Pentagon *Space News*, for example, called the U.S. policy statement rejecting a possible treaty approach as "premature" and argued instead, "It only makes sense to ban an activity that creates debris that threatens the satellites of many countries."[11] A much-quoted industry impact assessment issued in response to the Chinese test by the Teal Group warned ominously:

> An ASAT weapons race will have the effect of increasing the financial risk of any satellite program, and this will undoubtedly be felt most within

[10] "Statement to the Conference on Disarmament by Ambassador Christina Rocca, U.S. Permanent Representative," February 13, 2007, on the website of the U.S. Mission to the United Nations in Geneva, at: http://www.usmission.ch/Press2007/0208CDstatement.htm.

[11] "China's Anti-Satellite Test" (editorial), *Space News*, January 22, 2007, p. 14.

> the commercial market through decreased investor confidence and(or) high insurance rates.[12]

From a broader perspective, therefore, Intelsat's Chief Executive Officer David McGlade outlined a possible path forward:

> ...the future preservation of the space environment will rely on every nation's appreciation that its own self-interest lies in preserving this precious common good.[13]

Getting from Here to There

If the U.S. Congress wants to rejoin the debate on space weapons and take concrete steps to preserve safe U.S. access to space, it needs to follow a clear and coherent strategy and engage possible allies in the commercial community, among non-governmental space actors, and among other space-faring countries. To strengthen its case, the Congress also needs to encourage the administration to engage in more responsible international rhetoric (and behavior) regarding space security.

While not exhaustive, the following plan of action provides an outline of how such a strategy might be implemented over the next few years.

- First, a major campaign is needed to explain to the American public and the media why space *is* different from the Earth, the seas, and the world's airspace and should not be made into a battlefield. This campaign needs to include a focus on the unique problem of space debris, which (particularly after the Chinese ASAT test) is easily understandable by the general public. The commercial community could be a major ally here.

- Second, a clearer enunciation of the *range* of space security alternatives at the international level is needed. This discussion should include formal treaties but also considerably less cumbersome (yet possibly as effective) unilateral declarations, bilateral measures, multinational conventions, rules of the road, and codes of conduct.[14]

- Third, the space weapons debate needs to be separated from the missile defense debate. While there are arguments that are relevant to both issues, particularly in regards to space basing of missile defenses, there are also significant differences. The fact that many forms of missile defense use space as a point for interception does not mean that arms control in space

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[12] Teal Group Press Release, "Teal Group Assesses Satellite Market Impact of China ASAT Test," Fairfax, VA, January 22, 2007.
[13] David McGlade, "Preserving the Orbital Environment," *Space News*, February 19, 2007, p. 27.
[14] On this idea, see Michael Krepon, "Will the Bush Administration Endorse a Space Code of Conduct?" *Space News*, March 7, 2007, available on the Henry L. Stimson Center website at: http://www.stimson.org/pub.cfm?id=402.

should not be pursued. Strong, space-related arguments can (and should) be made for limiting the altitude of interceptions, banning space basing of weapons, halting a self-damaging race in laser weapons, and banning tests against orbital objects (which generate persistent debris). Such measures would create significant new protections for all users of space, particularly commercial entities and important downstream clients who rely on their orbital services.

- Fourth, a more detailed analysis is needed of the future costs of space weapons and the long-term trade-offs involved in pursuing a "weapons-first" agenda. Very little analysis has been done since the Bush administration entered office to estimate long-term architecture costs or to discuss relative priorities (versus other weapons systems, social programs, counter-terrorism, and the wars in Iraq and Afghanistan).

Despite current U.S. plans, it remains far from clear if the Pentagon will be able to deliver on costly, space-based weapons systems. It may also choose not to do so, if offered other options that are cheaper, less threatening, and more reliable. For all its criticism of treaties, the Bush administration currently is engaging in significant debris restraint and supports COPUOS's plan to approve a first-of-its-kind convention against space debris at its June 2007 meeting. These positive directions may point to areas where Congress and the administration can reach some common ground. But Congress should not waste the current opportunity to pursue new leads and also develop meaningful, alternative proposals to space weapons.

Conclusion

There are strong incentives for the United States to cooperate with other countries in ensuring future space security. Historical experience, however, shows that creative and sustained national leadership will be required if countries are going to overcome their mistrust and restrain natural tendencies toward active defenses in space. Critical among these factors will be the development and institutionalization of *international* space security talks toward a reconceptualized framework, one that downplays the current "state versus state" focus of many countries and instead emphasizes the notion of "environmental security" against shared threats in space. Space is a unique arena of human activity where weapons can have unintended and detrimental consequences for all users—adversary, ally, and even those deploying the weapon.

As the first 50 years of space security have shown, the greatest value from space is information: for communications, navigation, remote sensing, weather forecasting, and intelligence. All of these services depend on debris-free space and cooperation in managing potential conflicts over such issues as geo-stationary slots, broadcasting frequencies, orbital traffic, and space weapons. Perhaps greater awareness of the range of multilateral, environmentally related problems in space will allow countries to rethink some of their political assumptions about space competition and stimulate leaders to seek out new mechanisms for restraint-based cooperation.

As a final point, any review of space security options must take into account U.S. policies and their impact on global developments. Other nations look to the United States to lead by example. This means that we must begin to pay attention to how U.S. space policy reflects the priorities we place on military restraint in space, debris mitigation, and cooperative engagement.