Hearing of the Committee on Science, Space, and Technology; Subcommittee on Space
U.S. House of Representatives

"Space Traffic Management: How to Prevent a Real Life 'Gravity'"

Friday, May 9, 2014 - 10:00 AM

Testimony of Prof. P.J. Blount
Adjunct Professor, LL.M. in Air and Space Law,
University of Mississippi School of Law

I would first like to thank Chairman Palazzo, Ranking Member Edwards, and the members of the Subcommittee on Space for the opportunity to address the topic of Space Traffic Management (STM). STM is an increasingly important issue for the United States regarding both domestic regulation and international regulation. STM is a complex issue that combines commercial, civil, and security uses of space. My testimony today will focus primarily on the international obligations of the United States and how U.S. domestic STM regimes can be a critical tool in shaping the development of international STM regimes. My analysis will put priority on the maintenance of United States leadership in space and on ensuring the United States' ability to pursue its national interests.

My core argument is that the United States is in a unique position to be a leader in the development of international regulatory regimes. This in no small part will be aided by the careful development of domestic regimes that can be powerful tools in establishing the international standards that will ensure safe and secure access to outer space for the United States and others. This testimony will proceed in three sections. First, I will address the concept of STM from a definitional perspective in order to properly scope my analysis. Second, I will address the international obligations of the United States in the field of STM. Finally, I will conclude with a model for U.S. leadership in the development of international STM activities. To this end, I will highlight key principles that the United States should consider in developing a regulatory regime that both protects United States' interests and fosters an international system that facilitates safe and secure access to outer space by all actors well into the future.

I. Definitional Issues

STM has become an increasingly important topic for the international space community, but its definition changes depending on context. In 2006, the International Academy of Astronautics (IAA) released an interdisciplinary study on STM, which defined STM as "the set of technical and regulatory provisions for promoting safe access into and out of space, operations in outer space and return from outer space to Earth free from physical or radio-frequency interference."[1] This definition is particularly useful in that it sets up a framework for understanding the complex concepts that are involved with STM. While I will use this definition

[1] International Academy of Astronautics, *Cosmic Study on Space Traffic Management* (International Academy of Astronautics, 2006), 10.

and its framework in this testimony, I am not endorsing this definition for adoption into the U.S. law. Instead, I am using it as an analytical tool for parsing out the core issues that the United States will need to account for when developing its own regime. The definition of STM adopted in the domestic regime should be tailored to fit the specific context of the chosen regulatory structure. There are three important aspects to the definition advanced in the IAA study.

The first relevant element of this definition is that it accounts for the two components of STM: technical capabilities and legal provisions.[2] The importance of this cannot be overlooked. Legal regimes without technical regimes are empty protections of the space environment and vice versa. While these regimes interact and overlap, they are distinct. As a legal expert, my testimony focuses on how legal regimes interact with technical provisions, and I leave the technical specifics to those with proper competence.[3] Technical regimes encompass the set of technical capabilities for obtaining space situational awareness (SAA) data as well as the technical capabilities for asserting control over space activities. SAA is "generally defined as information about the space environment and activities in space that can be used to operate safely and efficiently; avoid physical and electromagnetic interference; detect, characterize and protect against threats; and understand the evolution of the space environment."[4] Technical capabilities allow for the physical control of space activities and involve a variety of technologies related to operational aspects such as space debris mitigation and remediation, on-orbit maneuvering, electromagnetic frequency usage, and launch and re-orbit processes.

Legal regimes on the other hand primarily concern jurisdiction of a government agency over the use of space technologies. As a general rule, technological realities are often far ahead of legal rulemaking, meaning that legal regimes need to maintain flexibility in order to adapt to technological change. STM will require a regulatory regime that accomplishes several functions. First, such a regime will need to address issues of access to SAA data and coordination of space activities among relevant actors. Second, the law will need to allocate the jurisdiction over activities related to STM to the appropriate agency or agencies. Finally, legal regimes should ensure that regulatory bodies are able to maintain proper control over space operators to ensure that they are engaging in best practices and using proper technology to preserve the space environment (e.g. implementation of space debris mitigation technologies).

The second important aspect of this definition is that STM covers three accepted phases of space operations: launch, on-orbit, and re-entry.[5] Effective STM requires an ability to coordinate operations during these phases in a unified manner. Safe and secure operations in space necessitate a regulatory regime that can govern space operators during all phases of operations. This should include a pre-launch review to confirm that planned operations have implemented proper technologies. Such pre-launch coordination will also need to ensure that the actors involved have properly planned space operations for the life of the spacecraft from launch

---

[2] *Id.* at 19.

[3] See for example, Matthew C. Smithman, *The Need for a Global Space-Traffic-Control Service: An Opportunity for US Leadership*, Maxwell Papers (Air War College, 2012) and Brian Weeden, *Going Blind: Why America Is on the Verge of Losing Its Situational Awareness in Space and What Can Be Done About It* (Secure World Foundation, 2012), http://swfound.org/media/90775/going_blind_final.pdf.

[4] Weeden, *Going Blind*, 5.

[5] For a full explication of these different phases of spaceflight see International Academy of Astronautics, *Cosmic Study*, 19.

to end-of-life. Finally, any STM regime will need to be designed to facilitate effective control over an operator to ensure compliance with the law.

The final important aspect of this definition is its articulation of the purpose of STM. STM is meant to ensure that space operations do not interfere with each other in terms of both physical interference and electromagnetic interference. These are different but related issues. Due to the nature of this hearing, I will limit my comments to issues of physical interference, but the coordination of electromagnetic interference should not be overlooked when developing governance structures. The dangers of physical interference are well documented.[6] Space debris is a growing challenge for space operations, and STM regimes will likely be initially designed to cope with this growing threat, because "curtailing the growth of the debris environment is essential to limiting the potential of future satellite collisions."[7] This means that law should manage space debris in three ways. First, as already stated, law will need to be able to assert itself during the pre-launch phase of space operations in order to ensure that the launch vehicle and the spacecraft are designed to minimize the creation of new space debris. Second, the legal regime must govern on-orbit operations, meaning that a government entity should be given jurisdiction over all on-orbit activities and have the ability to compel space operators to comply with legal obligations. Finally, a legal regime will require the capacity to coordinate on-orbit maneuvers in order avoid physical interference. This means that the regime must be designed to facilitate communication and coordination among a variety of stakeholders to avoid situations in which an on-orbit maneuver causes harmful interference.

II. International Obligations and STM

The international space law regime is based primarily on four treaties, which have been supplemented by a variety of other instruments including customary international law and "soft law" mechanisms.[8] As a threshold issue, I would like to make the distinction between international law and domestic law. Domestic law of the United States governs individuals and entities within the jurisdiction of the United States.[9] International Law, on the other hand, governs the way in which the United States interacts with other states. In the U.S. context, international law does not create domestic obligations unless it has been incorporated into domestic law through a proper process.[10] The United States may in fact owe obligations to other countries that are inconsistent with domestic law.[11]

While these regimes are separate in nature, in the context of space activities United States compliance with international obligations is of the utmost importance in maintaining its access to and use of space. This is because, the international regime is built around concepts of coordination and cooperation designed to maintain free access to space by all states. The

---

[6] See generally, International Academy of Astronautics, *Cosmic Study*, 31-33.
[7] International Academy of Astronautics, *Cosmic Study*, 33
[8] The four treaties are the Outer Space Treaty,the Rescue and Return Agreement, the Liability Convention, and the Registration Agreement.
[9] *See generally* on jurisdiction, P. J. Blount, "Jurisdiction in Outer Space: Challenges of Private Individuals in Space," *J. Space L.* 33 (2007): 299.
[10] In the U.S. this is primarily accomplished through ratification of treaties by the Senate in accordance with the Constitution's Art. 2.2.2.
[11] For example, this is the issue in *Medellín v. Texas*, 552 U.S. 491 (2008).

United States's ability to operate in outer space is affected directly by the space activities of other states, and engagement in the international community critical to ensuring that all states engage in space activities responsibly. Obviously, the establishment of international STM regimes "will limit the freedom of use of outer space," which is often considered an unpalatable infringement on U.S. sovereignty, but any international regime will need to be the result of consensus from which states can "expect specific as well as collective benefit - including an economic benefit."[12] As a result, the United States should seek to maintain its leadership role in developing international law with the "purpose of achieving the common good" that preserves U.S. national interests.[13]

Below, I will first address the international obligations connected to STM and space debris management that arise under the international space law regime. Then I will briefly discuss new soft law mechanisms and their effect on international STM obligations. This analysis concludes that the international regime is currently weak due to its lack of definite content in terms of rights and duties. In light of the this weakness, the United States should seek to strengthen its leadership in international fora to ensure that any adopted legal mechanisms are consistent with U.S. national interests.

A. The Outer Space Treaty

At the heart of international space law is the Outer Space Treaty.[14] This treaty articulates core legal principles by which states should abide as they conduct space activities. It was drafted during the Cold War with a central purpose of stabilizing state interactions in space in a tense security context. To this end the Outer Space Treaty is written in such a way as to articulate overarching principles for state behavior with few specific obligations. In the current context of space exploration and use, this means that the content of numerous treaty provisions is in flux, and state action is often the primary mechanism through which the content of these provisions is being developed.[15]

The United States has signed and ratified the Outer Space Treaty and is currently bound by the instrument. There are several Outer Space Treaty provisions relevant to STM. First, the principle of free access to outer space is embodied in the first two articles of the Outer Space Treaty.[16] Free access means that all states have equal free access to use outer space for peaceful purposes, and that other states should not interfere with such access.[17] This obligation

---

[12] International Academy of Astronautics. *Cosmic Study*, 17.

[13] *Id.*

[14] *See generally*, Paul Dembling and Daniel Arons, "The Evolution of the Outer Space Treaty," *Journal of Air Law and Commerce* 33 (January 1, 1967): 419–56.

[15] *See generally*, International Academy of Astronautics, *Cosmic Study*, 39 ("International space law is far from complete.") and P. J. Blount, "Renovating Space: The Future of International Space Law," *Denv. J. Int'l L. & Pol'y* 40 (2012): 515–686.

[16] Dembling and Arons, "The Evolution," 431-2.

[17] *See generally*, International Academy of Astronautics, *Cosmic Study,* 17. *The National Space Policy of the United States* states that the United States maintains a right to engage in self-defence in the area of space which might include that denial of access to space. White House, "National Space Policy of the United States of America" (Executive Office of the President, 2010), 3. This provision should be read as consistent with international law governing the use of force in which defensive activities are considered

is highly undefined and it is unlikely that it explicitly requires, on its face, states to engage in space activities in such a way as to avoid creating debris that could inhibit another state's access to space. Significantly, developing nations have used the free access principle as a justification for creating space debris during the early phases of their space programs.

Second and closely related to the free access principles, Article IX sets out principles that guide state interactions in outer space activities. It requires that states "shall be guided by the principle of cooperation and mutual assistance" and that states shall engage in activities "with due regard to the corresponding interests" of other states.[18] It also creates a corresponding right and duty to engage in consultations when a space activity by one state may harmfully interfere with an activity of another state.[19] Read together, these provisions articulate broad principles that are meant to facilitate free access. Article IX on its face may seem like a powerful provision for STM; however, the terms of this provision are substantially undefined.[20] As a result, Article IX is still being shaped by state action.[21] I have argued in the past that Article IX requires *de minimis* information sharing among states in order for states to comply with obligations.[22] U.S. actions in the past have implicitly endorsed such a stance on information sharing. This can be seen in U.S. activities relating to the intercept of *USA-193*, in which the United States gave an unprecedented amount of detailed technical information about its activity.[23] The principles in Article IX are important but malleable, and responsible U.S. space activities and regulation present a unique opportunity to give content to and operationalize Article IX in a way that encourages responsible behavior when states access space.

Third, Article IX also creates an obligation to not harmfully contaminate the space environment.[24] Harmful contamination is an undefined concept, and one that has traditionally not been invoked by states in relation to space debris creation. Even in the case of the intentional destruction of *FY-1C* during a Chinese anti-satellite test, no state invoked a breach of the obligation to not harmfully contaminate the space environment. This is likely rooted in a historical "right" to create space debris during the use and exploration of space, as well as a reluctance by states to create new limitations on civil or military uses of outer space. Increasing state action on space debris mitigation, though, could change the nature of this obligation.

---

peaceful. Any use of self-defense in outer space would only be proper in response to a non-peaceful space activity.

[18] Outer Space Treaty, Art. IX; *see also*, James Rendleman, "Space Traffic Management - Private Regulation?," in *AIAA SPACE 2012 Conference & Exposition* (American Institute of Aeronautics and Astronautics, 2012), http://arc.aiaa.org/doi/abs/10.2514/6.2012-5124, 5.

[19] Outer Space Treaty, Art. IX.

[20] Rendleman, "Space Traffic Management," 9.

[21] *See, for instance*, P. J. Blount, "Developments in Space Security and Their Legal Implications," *Law/Technology* 44 (2011).

[22] *Id.* at 30-35; *see also*, Rendleman, "Space Traffic Management," 9 (arguing that the changing nature of the space environment requires states to develop and maintain SSA capabilities, share SSA data, engage in cooperative monitoring of space activties, and engage in space debris mitigation)

[23] *See generally*, P. J. Blount and Joanne Irene Gabrynowicz, eds., *USA-193: Selected Documents* (National Center for Remote Sensing, Air, and Space Law, 2009).

[24] Outer Space Treaty, Art. VI.

Fourth, Article VII of the Outer Space Treaty sets out a liability regime for space activities, which is further articulated by the Liability Convention.[25] This regime holds that states are liable for damage caused by their space objects. This liability is strict when it applies to damage to aircraft in flight or the surface of the Earth, and is fault based when it applies to damage in outer space.[26] This liability regime has only been invoked once in the case of *Cosmos-957*, and this case sheds little light on the ambiguities in the regime. Currently, the status of a space debris as a "space object" is contested, but the United States has taken the position that space debris that is caused by a state will be covered by the Liability Convention.[27] Additionally, the nature of space debris is such that it is often difficult to attribute debris to a specific state for liability purposes. Going forward, an STM regime could be instrumental in assisting in determining attribution in situations in which space debris causes damage.

Fifth, Article VI creates an obligation for states to authorize and continually supervise space activities of non-governmental actors and gives a state "international responsibility" for the activities of such actors. This is an extraordinary provision in the context of international law, which generally does not hold a state responsible for actions of its private citizens. Article VI is a powerful provision in that it creates an affirmative obligation for states to maintain control over private actors in space, which most certainly includes STM activities such as debris mitigation. Such authorization and supervision is usually accomplished through licensing regimes found in the domestic law of states. As you know, the United States currently has one of the most robust licensing regimes, which has been influential worldwide. However, the United States regime currently falls short fulfilling the obligation of continuing supervision since it does not provide for on-orbit supervision of most space operations.

In addition to Article IX, the Outer Space Treaty has numerous other information sharing provisions as a way to foster international coordination and cooperation.[28] These provisions are often articulated in soft terms and do not create "hard" obligations.[29] However, the importance of these provisions should not be overlooked. As space becomes increasingly used by a variety of actors, coordination of space activities in order to preserve the space environment and to facilitate safe space operations will be critical. Any such coordination will be reliant on international data sharing. Information sharing provisions have been bolstered by other international instruments such as the Hague Code of Conduct.[30] Additionally, international institutions such as the Committee on the Peaceful Uses of Outer Space (UNCOPUOS) and the International Telecommunications Union (ITU) currently serve as the primary fora in which states

[25] Outer Space Treaty, Art. VII.
[26] Liability Convention, Art. IV.
[27] Blount and Gabrynowicz, *USA-193,* 51-59.
[28] Outer Space Treaty, Arts V (information on phenomena that may harm astronauts), Art. VIII (registration and information about space objects), X (observation of launches), XI (information regarding space activities), and XII (visits to space stations).
[29] For example Article XI only requires states to share information "to the greatest extent practicable and feasible."
[30] Hague Code of Conduct Against Ballistic Missile Proliferation (2002).

share information about their space activities.[31] Information sharing is likely to increase in importance as more entities engage in using space.

B. Soft Law

Soft law is international instruments that are regulatory in nature, but that create non-binding or weak obligations.[32] Soft law is probably best understood as international policy, and represents part of a "growing diversification" in regulatory structures.[33] Soft law comes in a variety of forms, and it generally articulates proper state behavior without articulating legally binding rights and obligations. Instead, soft law seeks to establish unenforceable political and moral obligations to other states. I have argued before that soft law regimes are likely the way forward when it comes to space law making at the international level.[34] This is because soft law mechanisms allow states to experiment with different types of regulation without entrenching regulatory systems prematurely. Soft law can form an integral part of the law making process at the international level by reducing the risks associated with hard law making. I will briefly address three of such instruments that have relevance to STM and could be seen as models for future development.

First is the Hague Code of Conduct, which I have previously mentioned. The Hague Code of Conduct is a soft law measure focused on nonproliferation of ICBM technology. It facilitates the exchange of pre-launch notifications of ICBM and space launches.[35] Such an information sharing regime would be essential in any international STM efforts, though it would need be more robust in order to facilitate the type of information sharing that is needed to ensure on-orbit management of space traffic. This would involve more expansive data and a system for the timely distribution of such data.

Second, the IADC Debris Mitigation Guidelines are a set of internationally agreed upon technical guidelines for mitigating orbital debris.[36] These guidelines have been approved by UNCOPUOS, and are supported by the United States. They serve as a likely model for the initial regulation of space debris. Technical guidelines are subject to change as technology evolves, and soft regulatory instruments are a particularly useful tool when technology is still developing rapidly. It gives states the ability to negotiate and implement guidelines while preserving the flexibility to adapt to new technological realities as they arise. In the short term nonbinding technical agreements and international pressure will likely be instrumental in developing international STM regimes. Long term international STM solutions will likely need structures

---

[31] UNCOPUOS manages a database of registered space objects, but the information required for registration is minimal. International Academy of Astronautics, *Cosmic Study*, 39. The ITU maintains the Master Frequency Register which includes orbital tolerances in the Geosynchronous Orbit, *Id.* at 22. Additionally, both the International Civil Aviation Authority (ICAO) and the International Maritime Satellite Organization (IMSO) provide information sharing on space activities that affect their respective competencies.

[32] *See generally*, Kenneth W. Abbott and Duncan Snidal, "Hard and Soft Law in International Governance," *International Organization* 54, no. 3 (2000): 421–56.

[33] International Academy of Astronautics, *Cosmic Study*, 38.

[34] Blount, "Renovating Space."

[35] International Academy of Astronautics, *Cosmic Study*, 39.

[36] Inter-Agency Space Debris Coordination Committee, *IADC Space Debris Mitigation Guidelines* (Inter-Agency Space Debris Coordination Committee, 2002).

such as those found in the ITU or ICAO in order to facilitate the regular updating of technical regulations.

Finally, Draft Codes of Conduct, such as the one proposed by the European Union can help to define what is acceptable state behavior. Codes of conduct create a political space in which states can begin to negotiate acceptable behavior. An international STM regime will need to define what is acceptable behavior in space, and such definitions are currently highly contested. Codes of conduct can help establish common ground among states, which can be leveraged to achieve consensus.

III. United States Leadership in STM

The United States has maintained itself as a leader in civil, commercial, and military space use and exploration since the very beginnings of the space age, and it has had a major influence on the development of international legal regimes. It has done this not only through direct negotiation of space treaties, but also through its own practices and international outreach activities. Examples include the use of the term peaceful purposes in the 1958 Space Act, which has become a threshold for all space activity[37]; the nondiscriminatory access to remote sensing data provisions found in *Landsat* data policies, which became one of the bedrock principles of remote sensing law[38]; and the FAA's active engagement in spreading information about its regulations to other states.[39]

In light of the ambiguous nature of the content of international regulations, the regulatory approach adopted by the United States will likely be highly influential in shaping how the international community develops STM regimes. International regimes will need to account for "harmonizing national space legislation, its licensing standards and procedures,"[40] and as a "leader[] in commercial space, [the United States] must engage with the international community and shape international standards to improve safety."[41] The United States is in a unique position to exert great influence on the development of the international principles that will guide international STM institutions, and great care should be taken to craft a regime that will positively influence any developments at the international level wherein severe lacunae exist. It should be emphasized that United States' engagement in the development of the international regime should pursued in such a way as to protect U.S. national interests associated with space activities such as "the Nation's technological advancement, scientific discovery, security and

---

[37] National Aeronautics and Space Act of 1958, sec. 102.

[38] *See generally*, Joanne Irene Gabrynowicz, "The Perils of Landsat from Grassroots to Globalization: A Comprehensive Review of US Remote Sensing Law with a Few Thoughts for the Future," *Chi. J. Int'l L.* 6 (2005): 45.

[39] The Secretary of Transportation is tasked with "[advocating] internationally for the adoption of United States Government safety regulations, standards, and licensing measures to enhance global interoperability and safety of international commercial space transportation activities." White House, "National Space Transportation Policy," (November 2013). http://www.whitehouse.gov/sites/default/files/microsites/ostp/national_space_transportation_policy_11212013.pdf, 5. *See also*, George Nield, "Statement before the House Committee on Science Space, and Technology, Subcommittee on Space, on Necessary Updates to the Commercial Space Launch Act," February 4, 2014, http://testimony.ost.dot.gov/test/nield1.pdf, 6.

[40] International Academy of Astronautics, *Cosmic Study*, 40.

[41] Nield, "Statement," 5.

economic growth."[42] The United States should engage the international community in order to establish a regime that best supports U.S. interests, whether commercial, civil, or security.

Currently, the United States system for managing space traffic is fragmented among a number of agencies: the FAA regulates launch and re-entry activities and space debris associated with launch activities[43]; the FCC regulates electromagnetic spectrum as well as space debris mitigation[44]; NOAA has jurisdiction over remote sensing satellites and debris mitigation[45]; the State Department is involved with international coordination; and DoD is responsible for SAA data collection and dispersal. Each of these agencies have specific regulatory goals that they are trying to achieve, for instance the FAA's primary goal is safety, DoD's primary goal is national security, State's is foreign relations, and FCC and NOAA are concerned with technical issues and fostering commercial use. All of these interests are important, but at times they can compete. As a result a balance needs to be struck among these interests in order to properly govern space activities to maintain "assured access to diverse regions of space . . . in support of civil and and national security missions."[46] This is not to say that a single agency regime should be preferred over a multi-agency regime, but instead to point out how competing regulatory interests affect the current regulatory structure.

Domestic STM regimes will need to cover a number of aspects of space activities including safe operations, collision avoidance, information on space operations, observations of space operations, and the prevention of space debris.[47] Additionally, these regulatory structures will need to be able to cope "as new actors and capabilities emerge."[48] Regulations will also need to create predictability and safety. This can reduce risk for space actors and promote the United States industrial base by providing clear articulation of what constitutes responsible behavior in outer space.[49] Notably, these regulations will need to be designed to ensure U.S. compliance with Article VI obligations in order to protect the United States from liability exposure caused by private actors.[50]

Whether STM at the domestic level is maintained as a multi-agency system or consolidated into a single agency, several core principles should guide the architecture of the system.[51] Incorporation of these principles into domestic regimes will help to structure a system that can serve as a model for other nations and influence the development of an international regime. These principles are transparency and access, unambiguous jurisdiction, and the maintenance technical competence.

---

[42] White House, "National Space Transportation Policy," 1.
[43] 14 C.F.R Chapter III (2014); and White House, "National Space Transportation Policy," 5; and Nield, "Statement," 3.
[44] 47 C.F.R. part 27 (2014).
[45] 15 CFR Part 960 (2014).
[46] White House, "National Space Transportation Policy," 2.
[47] International Academy of Astronautics, *Cosmic Study*, 41-42.
[48] White House, "National Space Transportation Policy," 1 and Nield, "Statement," 3.
[49] White House, "National Space Transportation Policy," 5 & 7 and Nield, "Statement," 2-3, 7.
[50] Nield, "Statement," 5.
[51] There are feasible frameworks that can be built around either a single agency or a multi-agency regulatory paradigm.

A. Data Transparency and Access

As already noted the United States has an international obligation to engage in numerous types of information sharing, but there is no positive obligation to engage in the sharing of SAA data. While Article IX of the Outer Space Treaty could be read in such a way as to create such an obligation, there is little support in state practice that such an obligation exists.[52] Despite the lack of a positive obligation the United States is currently a leader in space data distribution.[53] The Department of Defense provides publicly unclassified SAA data via the SATCAT,[54] but this data has been criticized as "untimely and insufficient."[55] Most countries with SAA capabilities do not distribute this data.[56] The U.S. does not distribute classified SAA data, which includes data concerning military satellites, thus while maintaining one of the few publicly available databases, the U.S. system has come under criticism for distributing incomplete datasets.[57]

Transparency is a critical component of any STM regime. Transparency in SAA data allows space operators to engage in space operation in a responsible manner, and enables regulators to make proper regulatory decisions.[58] National security interests are connected to space data distribution, but national security is also served by ensuring that space actors have the ability to identify and avoid threats to their operations.[59] A regime that ensures "an orderly and transparent use of orbits will be necessary in the self-interest of military actors as well."[60] While there may be some space data that is sensitive, an increasing amount of information on the orbital parameters of classified satellites is becoming available in the public domain undermining such secrecy. The gaps in the U.S. system have led to the development of the Space Data Association (SDA), which is a conglomerate of space operators that have agreed to share information among themselves.[61] SDA represents a positive development, but the United States could do more in facilitating safe operations by granting transparent access to its SAA data. Transparency is a value that will be important to the future development of future

---

[52] *But see*, Rendleman, "Space Traffic Management," 9.

[53] The U.S. military has distributed such data since 1958. Weeden, *Going Blind*, 16. The IAA notes that the United States and Russia have the most developed capabilities for collecting SAA data and that other states "maintain tracking of space assets, but lack the capability to monitor space traffic as a whole." International Academy of Astronautics, *Cosmic Study*, 35.

[54] *See*, Weeden, *Going Blind*, 12-16. It should be noted that this system is not without critique for its coverage gaps and the dated state of the technology it relies on. *See generally*, Matthew C. Smithman, *The Need for a Global Space-Traffic-Control Service: An Opportunity for US Leadership*, Maxwell Papers (Air War College, 2012) and Weeden, *Going Blind*, 6-7.

[55] Smithman, *The Need*, 160.

[56] Russia and China do not publish SAA data publicly and the EU does not plan on doing so either. Smithman, *The Need*, 160.

[57] Smithman, *The Need*, 160.

[58] The IAA notes a total of six orbital elements that describe satellite motion in a transparent manner. See International Academy of Astronautics, *Cosmic Study*, 34-5. The U.S. database only distributes minimal data. Weeden, *Id.* at 36.

[59] International Academy of Astronautics, *Cosmic Study*, 18-19. The IAA study notes that the nature of military operations creates specific issues for STM, but that military operations will eventually benefit from international coordination on STM. *Id.* Weeden argues that open SSA data will "play and increasingly important role in in international security and stability." Weeden, *Going Blind,* 11.

[60] International Academy of Astronautics, *Cosmic Study*, 53.

[61] It should be noted that SDA includes governmental members. Brian Weeden, *Going Blind*, 9-10.

international regimes, and the United States should be a leader in promoting data sharing at the international level.

Related to transparency is access to space traffic data, since "there is a need to provide all satellite operators with the basic information necessary to operate in a safe and efficient environment."[62] This is especially true if, a multi-agency regulatory model is maintained. In the current fragmented regime, there is no central clearinghouse for information on space traffic, despite the fact that "[i]nformation sharing and mutual assistance are counted among tools employed by system operators to mitigate threats."[63] While agencies do coordinate actions, operators must avail themselves to a variety of sources to gain access to full sets of data on space activities. This is the gap that SDA is attempting to fill.[64] Giving an agency the competency to provide interagency coordination could smooth the licensing procedure and provide a specific locus within the STM regime for obtaining data on space activities. Additionally, such an entity could also serve as the interface for international data sharing. Increasing access to SAA data would be consistent with U.S. interests, and this data is critical in making accurate predictions of potential collisions.[65] International data could be collected and integrated into U.S. datasets in order to give United States' operators more robust information and to give regulatory agencies an enhanced ability to determine what actions need to be taken to ensure safe and secure space operations.[66]

B. Unambiguous Jurisdiction

Currently in the United States system, there is divided jurisdiction over private space operations. The FAA regulates launch and re-entry activities of space actors, the FCC governs satellites that need radio-communications frequencies (which is practically all satellites and spacecraft), and NOAA governs satellites with remote sensing capabilities. All three have jurisdiction over space debris mitigation through reviews of operational plans during the licensing processes. Notably, though, no agency has complete on-orbit jurisdiction. So for instance, while a satellite operator can be required to implement shielding on a satellite in order to reduce the likelihood of debris creation, there is no agency that could force that operator to move its satellite in the case of a possible collision. This gap in jurisdiction is problematic as space becomes more populated, and filling it is a needed measure in order to ensure that U.S. space operators comply with acceptable standards.

Establishing such jurisdiction is important in ensuring that the United States' can fulfill its international obligation to "continually supervise" its non-governmental actors in space as required by Article VI of the Outer Space Treaty. Such a regime could lead to the creation of best practices for responsible conduct that could become integral parts of international standards for behavior. Additionally, vesting an agency with on-orbit jurisdiction will give much

---

[62] Weeden, *Going Blind*, 10.
[63] Rendleman, "Space Traffic Management, 3.
[64] Weeden, *Going Blind*, 9.
[65] International Academy of Astronautics, *Cosmic Study*, 67
[66] Weeden notes that while "it is technically feasible for one state to build the network of sensors required to accomplish tracking" space objects economic and geographic factors severely limit a states ability to effectively gather this data. Weeden, *Going Blind*, 8.

needed legal certainty to commercial space actors, which can help to foster commercial activities.

C. Ensuring Technological Competence

STM is an undertaking that requires a great deal of technological capabilities, and there is a need to establish a regime that can manage these technologies. Currently, DoD maintains a prominent role in gathering space data, and the FCC, FAA, and NOAA all maintain specific control over technical aspects of launch vehicles and spacecraft. However STM is organized though, it is important to ensure that regulatory agencies have the technological capability and expertise to maintain these activities.

In the current licensing regime agencies in charge of licensing are given jurisdiction based on specific technological functions of the object being regulated. Jurisdiction is divided along functional grounds, which ensures that the regulating agencies have specific technological expertise. Fragmenting jurisdiction along these lines, while not without it's problems, is an effective way to ensure that there is proper attention and expertise given to regulating each aspect of a spacecraft's operations.

SAA data gathering is a more complex issue. SAA has definite national security implications, but any STM regime will need complete data in order to execute proper conjunction analyses. Commentators have argued for a number of approaches such as leaving these functions with DoD and upgrading them[67]; relying on private entities to collect and maintain data and to execute conjunction analysis[68]; and transferring these capabilities to the civilian sector to better increase global access.[69] There are drawbacks to each of these: if the system is upgraded and access to data is expanded, DoD maintenance will always draw fire for lack of transparency;[70] if commercial entities such as SDA are trusted with the task, then there is an effective transfer of a state's Article VI supervision duties to nongovernmental actors; and if these technologies are transferred to the civilian sector, then a massive technology transfer to an agency that does not have previous experience with such technology must take place.

Closely linked to data gathering is the operationalization of this data. SAA data must be analyzed in order to determine when there is the risk of conjunction events. Currently, DoD performs this function to a limited extent.[71] An agency given on-orbit jurisdiction will either need to be able to run conjunction analyses on its own or be able to obtain reliable and up to date information on possible collision events from another agency or third party. Without this type of information, a regulatory agency will not be able to effectively maintain control over space activities.

Ensuring that there is proper technical expertise in regulating agencies also allows the United States to be able to actively engage in international fora and advance technical standards that best ensure safe and secure space operations. By maintaining this expertise within

---

[67] *See generally*, Smithman, *The Need*.
[68] *See generally*, Rendleman, "Space Traffic Management."
[69] *See generally*, Weeden, *Going Blind*.
[70] International Academy of Astronautics, *Cosmic Study*, 18 ("The naturally secret nature of military activities makes it difficult to see how they can fit in a system that has to be based on transparency").
[71] Smithman, *The Need*, 158.

government agencies, the United States can be a leader in driving the development of technical regulations.

IV. Conclusion

STM operations are becoming increasingly important as space activities proliferate globally. As the United States considers the regulatory regime that will govern STM in the domestic sphere, it should also consider the underlying international legal obligations and the effect of domestic regulations on the development of international STM institutions.

In establishing the STM regime, regardless of whether it is designed around a multi-agency model or a single central agency model, specific principles that the United States' should consider in order to effectuate an effective regime are:

- Transparency and Access
- Unambiguous Jurisdiction
- Ensuring Technological Competence

Incorporating these elements will ensure that the United States promulgates domestic regulations that are not just compliant with international legal regimes, but also have an impact on the development of international law in a positive manner consistent with United States interests in the peaceful use of outer space across the spectrum of private, civil, and military activities.

Thank you again for the opportunity to testify on this topic. I look forward to answering your questions.