

# The New Frontier of National Security: Preventing Conflict and Protecting Freedom in Space



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# Introduction

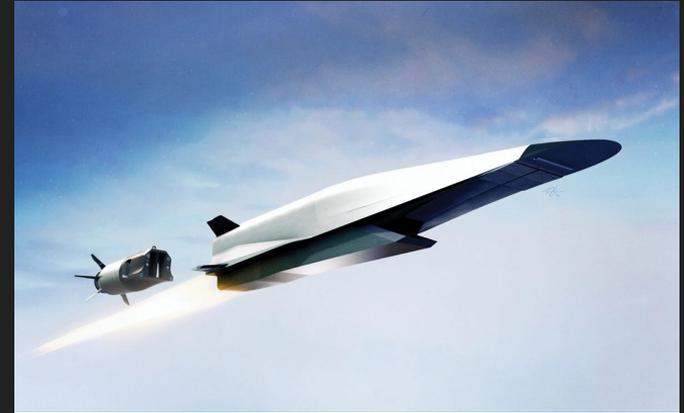


Outer space is once again becoming a field of primary importance for national defense.

- Technological advancements and the commercialization of space have bolstered an unprecedented period of space-focused innovation.
  - Reusable rockets
  - Space tourism
  - Plans to return to the moon

# Introduction

- At the same time, the capacity of our adversaries to project power in space grows.
  - Anti-satellite weapons
  - Hypersonic missiles
  - Electronic jamming devices
  - GPS tampering technologies
- These threats are supplemented by the weak enforcement of international space legislation.



# Research Goals

- Assess policies and strategies that the United States Space Force and the government should pursue in order to deter conflict in space and protect our national interests in space exploration and commerce.
- Examine international legislation proposals that would create mechanisms of accountability for adverse actions in space.

# International Space Law and Regulation



# Laws and Principles of the United Nations of Outer Space

- The majority of international space regulation consists of soft laws with few guardrails.
  - Five UN Conventions: The Outer Space Treaty, the Rescue Agreement, the Liability Convention, the Registration Convention, and the Moon Agreement
  - The rapid development of space technologies has created many challenges for these laws, mainly that of obsolescence.
- Artemis Accords of 2020 were important step
  - Commitment of transparency in the dissemination of space policies and scientific data.
  - Deconfliction of space activities.
  - However, lack of penalties for breaches of compliance may be a challenge.

# Sovereignty and Property Rights in Space

**Background:** The 1972 Convention on International Liability for Damage Caused by Space Objects provides a basis for liability claims for any damage caused by space objects belonging to a “launching state.”

## Role of the private sector needs to be reflected in international conventions

- Prior conventions do not address modern concerns about the orbital trafficking with regards to the private sector, nor provide clear procedures for damages caused by space debris.
  - Estimated that SpaceX’s Starlink satellites are involved in about 50% of spacecraft close encounters on a weekly basis
- Can cause friction between nations
  - E.g.: China filed a formal complaint against SpaceX for allegedly requiring Chinese astronauts to take evasive maneuvers to avoid colliding with SpaceX satellites in late 2021

# Accountability for Generation and Mismanagement of Space Debris

## Background: The Registration Convention of 1976

- Created with the aim to allow for the identification of objects in space
- However the act of registering a space object does not necessarily bestow nationality on the registered object, making it more difficult to assert ownership of debris to a particular nation from a legal perspective.
- The Outer Space Treaty may be applicable when considering the production of space debris, this legal framework is unlikely to deter kinetic energy weapons testing

## Significant Issues:

- More difficult for parties to access space
- Satellites and space stations face increasing risk of damage
  - Kessler Syndrome: “a phenomenon in which the amount of junk in orbit around the earth reaches a point where it creates more and more space debris.”
  - Costly and may raise questions of liability as aforementioned.
  - Heighten tensions between states, with conflict arising over who compensates for damage in space, and potential mistaking of collision as intentional attacks.

# Digital Warfare

- No current international treaties regarding cyber-attacks of satellites and satellite protection
- UN charter permits use of force by a nation in case of self defense
- No universal definition of a cyber attack

# Emerging Technologies and Developments

# Semiconductor Procurement and Development

- Main U.S. goal: stay ahead of Russia and China technologically
- Major obstacle is the semiconductor shortage
  - Worsened by supply chain issues from COVID-19
- U.S. needs to diversify electronic component imports and manufactures
  - Over 60% of semiconductors are Taiwanese made
  - U.S. supply at risk in the event of a Chinese invasion

# Satellite Development

- Current largest strides are from U.S. rivals
  - These rivals aim to intimate U.S. and its allies
- American partners such as France, Israel, and Japan making progress as well
  - France implementing new space defense strategy
  - Japan cooperating with U.S. on space security

# Digital Threats

- All aspects of space infrastructure is under threat of cyber attacks
  - Successful information theft from NASA in 2019
- Satellite communication such as GPS are especially vulnerable
  - Both civilian economy and military operations depend on information from GPS
  - Disruption of information is not the only threat; also “spoofing”
- Space Force looking to strengthen GPS and DoD is exploring backups and alternatives

# Physical Threats

- China and Russia are working on physical anti-satellite weapons
  - Both nations have conducted tests of these weapons
- Space debris caused by weapons testing
  - Lingers in space, threat to both economy and communications
- Hypersonic Missiles
  - Travels through space, one of the greatest threats to U.S. security
- Chinese and Russian Approaches against the U.S.
  - Russia looking to counter any U.S. capabilities, such as with anti satellite lasers
  - China looking to build their own space communications and intelligence network, has current fleet of 120 Satellites, also pursuing anti satellite weapons

# Capitalism in Outer Space

- The United States benefits greatly from private-sector collaboration.
  - Production of carrier rockets
  - Placing satellites into orbit around Earth
  - Long-term exploration, exploitation, and colonization of celestial bodies.
- Starlink is one of the best examples of the private sector aiding the interests of the United States.
- However, the private-sector can only be a comparative advantage with appropriate regulations.

# Policy Recommendations

# Adopt historical lessons from the Naval Agreements to develop a new International Space Treaty with appropriate guard rails:

- Following the aftermath of World War I, the Washington Naval Treaty of 1922 sought to ensure a balance of power between the victorious allied powers.
  - Maximums on the number of ships that each navy could use and limits on the size of battleships.
  - This treaty was largely successful for the first decade of its existence, largely because all the signatories had an interest in maintaining it.
- However, the treaty unravelled in the 1930s and rearmament began in earnest. The Washington Naval Treaty had four major flaws:
  - It did not allow for independent checks. Countries self-reported, allowing them to more easily misconstrue what they were doing.
  - No independent body to affirm that every nation was acting in accordance with their obligations.
  - There was no mechanism for enforcement.
  - Finally, it was not able to adapt to changing technology. It did not even discuss aircraft carriers, for example.

## Adopt historical lessons from the Naval Agreements to develop a new International Space Treaty with appropriate guard rails:

With the lessons of the past in mind, the U.S. Space Force should work with its international partners to create a new international space treaty that seeks ensure peace in space.

- Define sovereignty and impose arms control limits in space through independent checks verified by an independent international body.
- This treaty would need to be regularly revised to account for changing circumstances, especially technology advances.
- Further, there would need to be mechanisms for accountability, such as limiting access to international space assets for those who violate the treaty.

# Improve domestic space regulation and define national jurisdiction of space-faring objects and satellites:

- Legally clarify what constitutes a cyber attack on satellites
  - Ambiguity may deter cyber crimes out of fear of provoking the U.S OR cause nations to test the boundaries
  - Move Towards an Effects-Based Approach
    - Move away from terminology such as “use of force” as outlined in the UN Charter
    - Move towards legally distinguish a cybercrime from a cyberattack through an effects-based approach
  - Discuss the creation of specific, enforceable international laws for satellite attacks and protection rather than rely on the International Telecommunications Union to regulate satellites.
- Define legalities surrounding space debris: Two possibilities
  - Expand the 1972 Liability Convention to declare all objects within a nation’s spacecraft as the legal responsibility of that particular nation and expand initiatives to track space debris, such as NORAD in the U.S. and Canada, to assign liabilities.
    - This approach’s feasibility is bolstered by the precision of the U.S. Space Force Surveillance Network, which has the capability to monitor “about 30,000 live and defunct satellites and pieces of debris down to the size of 4 inches.”
  - Implement a fine for space debris paid by the nation responsible for a collision
    - Given that the issue of financial compensation for damages caused by space debris could be complicated by the difficulty with associating space debris to a particular nation
    - This fine could then be used to compensate a nation whenever a space debris collision destroys national property
    - Decentivize the testing of kinetic energy weapons like direct-ascent anti-satellite missiles

# Invest in the development of weapon systems capable of rivaling or outperforming the technology of our rivals in space:

- U.S. goal is to prevent militarization of space by hostile governments
- This can be achieved through deterrence
  - Any weapons our enemies may have, we must be able to defend against
  - We must match or outperform enemies with any offensive weapons
  - End goal is to show “we can hurt you” and “you cannot prevail” to enemies, disincentivizing any further aggression
- In case of hostile enemy action, U.S. must have capability to neutralize all enemy space assets and weapons

## Develop defense systems capable of protecting American satellites and space networks from space debris, cyberattacks, and belligerent offensive action:

- Russians and Chinese show disregard for the consequences of weapons tests
  - Future U.S. satellites must be able to destroy floating debris in self defense
- More investment into cybersecurity in order to preserve communication channels
- Space Force must cooperate with other U.S. military branches, NATO and other allies on the issue of space defense
  - Not just on the military side, but also technology and supply chains

# Promote and uphold the independence of the Space Force

- The Space Force must have the authority to act on national interests without being hampered by needless bureaucracy and budget limitations. It must have the same authority as the Army, Navy, and Air Force.
- Secure a larger budget for personnel recruitment and the further development of large-scale projects, as the Space Force continues to gain traction within the United States government.
- In crisis situations, the Space Force must have the authority to take executive action and engage in quick response protocol.

## Concluding Remarks:

The future of space rests upon the rules of the game that end up taking effect, rules that are implemented by whoever is able to establish a presence in space first. This is why, when it comes to space exploration and commerce the United States must lead.

To do so, the government of the United States must reinforce its commitment to a free and secure outer space by granting the Space Force more independence and agency.