



Dual-Use Satellites and the Law of Armed Conflict: The Tension Between Targeting Rules and State Responsibility in Outer Space

Written by Sofia Niiles

Edited by Caterina Ecclesia, final editing by Lara Lamie

Abstract

Contemporary armed conflicts increasingly rely on privately operated satellite systems that provide communication, navigation, and intelligence services. Because these systems frequently serve both civilian and military purposes, they raise difficult questions at the intersection of international humanitarian law (IHL) and international space law. This article examines how international law classifies and attributes responsibility for privately owned satellites used in armed conflict. It argues that a doctrinal inconsistency arises between the targeting rules of IHL and the attribution framework established by Article VI of the Outer Space Treaty (OST). A commercial satellite may become a lawful military objective because it effectively contributes to military action, while its activities remain legally attributable to a different state that merely authorized and supervises the operator. The resulting mismatch between targetability and responsibility risks undermining neutrality, creating accountability gaps, and increasing the potential for escalation. The article concludes that greater clarification of existing attribution and targeting rules is required to preserve legal certainty in contemporary space operations.

Key words: International Humanitarian Law, Outer Space Treaty, Dual-Use Satellites, State Responsibility, Military Objectives, Neutrality in Armed Conflict, Commercial Space Activities

Introduction

Outer space is no longer an exclusive governmental playground. Contemporary military operations increasingly rely on privately owned satellite companies that provide intelligence and communications services across the globe. can now be utilised to support battlefield coordination and military operations.¹ A satellite that delivers internet access to civilians could, at the same time, enable military control.² When such a dual-use satellite becomes involved in armed conflict, a legal question emerges: Can the satellite be lawfully attacked, and if so, which state

¹ Giorgia Conte, 'Assessing the True Extent of Dual-Use Potential in Satellites Through a Spectrum-Based Classification Model' (Master's thesis, Politecnico di Torino 2025) 1.

² Ibid 19.



bears responsibility?

Historically, there was no such question asked in the global sphere. Early space activities were conducted almost entirely by states and largely for scientific and security purposes.³

Governments financed and launched space objects, while private companies acted primarily as contractors developing technology according to governmental requirements.⁴ However, over the past two decades this model has inverted. Commercial actors now operate large constellations of satellites and provide services to multiple states simultaneously.⁵ The space sector has therefore evolved into a hybrid environment in which the boundaries between public and private, and between civilian and military activity, are becoming increasingly blurred.⁶

The legal framework governing armed conflict and the legal framework governing outer space were both developed for a state-centric model of warfare.⁷ Yet now, modern conflicts depend on privately owned satellite infrastructure that operates globally and serves both civilian and military actors.⁸ This creates a doctrinal difficulty, because IHL determines whether an object may be attacked based on the function it performs in military operations.⁹ By contrast, space law attributes private space activities to the state that authorizes and supervises the satellites.¹⁰ A single satellite could therefore be treated as part of one state's war effort while legally connected to another state that did not agree to participate. This article examines the collision between targeting rules under IHL and state responsibility under the OST, specifically Article VI, in relation to privately operated satellites.

Therefore, the article asks: How does international law classify and attribute responsibility for

³ G Blair Kuplic and Jonathan Sawmiller, 'Humanity on the Final Frontier: Challenges in Applying International Humanitarian Law to Modern Military Space Operations' (2024) *International Review of the Red Cross* 203.

⁴ Joshua J Wolff, 'Interrupted Broadcasts? The Law of Neutrality and Communications Satellites' (2021) 45 *Journal of Space Law* 239, 240.)

⁵ Giorgia Conte, 'assessing the True Extent of Dual-Use Potential in Satellites Through a Spectrum-Based Classification Model' (Master thesis, Politecnico di Torino 2025) 20.

⁶ *Ibid* 1.

⁷ G Blair Kuplic and Jonathan Sawmiller, 'Humanity on the Final Frontier: Challenges in Applying International Humanitarian Law to Modern Military Space Operations' (2024) *International Review of the Red Cross* 200, 212.; Christian Joseph Robison, 'Changing Responsibility for a Changing Environment: Evaluating the Traditional Interpretation of Article VI of the Outer Space Treaty in Light of Private Industry' (2020) 5(1) *University of Bologna Law Review* 1, 3.

⁸ Sara von Bonsdorff, 'From Satellites to Battlefields: Use of Outer Space for Peaceful Purposes, the Use of Force and the Right to Self-defence in the Modern Space Landscape (Master's thesis, Åbo Akademi University 2024) 2-3.

⁹ G Blair Kuplic and Jonathan Sawmiller, 'Humanity on the Final Frontier: Challenges in Applying International Humanitarian Law to Modern Military Space Operations' (2024) *International Review of the Red Cross* 219.

¹⁰ Joshua J Wolff, 'Interrupted Broadcasts? The Law of Neutrality and Communications Satellites' (2021) 45 *Journal of Space Law* 269.; Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (adopted 27 January 1967, entered into force 10 October 1967) 610 UNTS 205 (outer Space Treaty) art VI.



privately owned satellites used in armed conflict? This article argues that the simultaneous application of targeting rules and attribution rules produces a structural inconsistency in international law. A commercial satellite may be lawfully targeted because of its military use while its activities are legally attributed to a different state based solely on authorization.¹¹

Altogether, the state whose conduct renders the object attackable might not be the state that bears legal responsibility. This mismatch undermines neutrality, creates accountability gaps, and lastly increases the potential risk of escalation in armed conflict.¹²

The dual-use nature of modern satellites

Over the last two decades, the space sector has changed profoundly.¹³ The first human activity in outer space was for research and security purposes conducted solely by states. Only governments had the necessary funds at the time to engage in space exploration.¹⁴ But, in recent years, the private space sector has grown and made great advancements in the commercialization of outer space.¹⁵ Once clearly controlled by governments, it has developed into a hybrid environment where the boundaries between public and private, civil and military are progressively blurred.¹⁶

Satellites are no longer conceived as instruments for a single and well-thought-out plan, but rather as flexible assets designed for economic and strategic objectives. Many satellites that have been formally designed for civil or commercial functions, can concurrently enable military or intelligence activities, supporting surveillance, communication or navigation in tactical contexts. The coexistence of these varied purposes challenges the traditional binary classification that distinguishes civilian from military missions. The emerging overlap between civil and military applications has also raised new questions of responsibility and legality.¹⁷

¹¹ Joshua J Wolff, 'Interrupted Broadcasts? The Law of Neutrality and Communications Satellites' (2021) 45 *Journal of Space Law* 252-253.

¹² Moamen Mohamed Sayed, Li Shouping and Zagra Alievna Gadzhieva, 'Interpretation and Implementation of "Peaceful Purposes" in Military Activities in Outer Space: Legal and Political Implications' (2024) 25 *Aerospace China* 37, 44.

¹³ Giorgia Conte, 'Assessing the True Extent of Dual-Use Potential in Satellites Through a Spectrum-Based Classification Model' (Master's thesis, Politecnico di Torino 2025) 1.

¹⁴ Joshua J Wolff, 'Interrupted Broadcasts? The Law of Neutrality and Communications Satellites' (2021) 45 *Journal of Space Law* 240.

¹⁵ Christian Joseph Robison, 'Changing Responsibility for a Changing Environment: Evaluating the Traditional Interpretation of Article VI of the Outer Space Treaty in Light of Private Industry' (2020) 5(1) *University of Bologna Law Review* 1.

¹⁶ Giorgia Conte, 'Assessing the True Extent of Dual-Use Potential in Satellites Through a Spectrum-Based Classification Model' (Master's thesis, Politecnico di Torino 2025) 1.

¹⁷ *Ibid.*



One of the main consumers of high-resolution imagery has been the military. While most of that imagery has been provided by national satellite assets, commercial imagery systems have also emerged for military usage.¹⁸ As an example, during the ongoing war in Ukraine, satellites have played a pivotal role in managing the conflict and supporting military operations. They have provided valuable intel, such as revealing Russia's military preparations through commercial satellite imagery and addressing the Ukrainian armed forces' critical need for satellite communications. This has been made possible through private space companies' contribution to the conflict such as SpaceX's Starlink satellite mega-constellation as an instrument.¹⁹

The prevalence of space systems today is what is typically referred to as 'dual-use', serving both civilian and military purposes. For instance, a commercial entity providing satellite communications like voice, data and video transmission might be contracted to provide services to militaries and civilians alike as seen with SpaceX and Ukraine. Similarly, satellites that take high-resolution images can simultaneously be used for civilian objectives such as urban planning and development, and environmental monitoring, while also providing imagery critical to military intelligence, surveillance and reconnaissance.²⁰ Nevertheless, modern satellite systems are intrinsically dual-use, meaning the traditional legal division between civilian and military objects no longer corresponds to technological reality.²¹

Targetability under International Humanitarian Law

IHL, also known as the "law of armed conflict," provides a legal framework for the conduct of hostilities and requires parties to distinguish between civilian and military objectives.²²

Under Article 52(2) of Additional Protocol I to the Geneva Conventions, if an object qualifies as a military objective, it may therefore be made the subject of attack. Lawful military objectives are "objects which by their nature, location, purpose or use make an effective contribution to military action and whose total or partial destruction, capture or neutralization, in the

¹⁸ J Todd Black, 'Commercial Satellites: Future Threats or Allies?' (1999) 52(1) *Naval War College Review* 99, 100.

¹⁹ Alexandros Kolovos, *Commercial Satellites in Crisis and War: The Case of the Russian-Ukrainian Conflict* (Occasional Paper No 3, Hellenic Air Force Academy 2022) 3.

²⁰ G Blair Kupic and Jonathan Sawmiller, 'Humanity on the Final Frontier: Challenges in Applying International Humanitarian Law to Modern Military Space Operations' (2024) *International Review of the Red Cross* 219.

²¹ Giorgia Conte, 'Assessing the True Extent of Dual-Use Potential in Satellites Through a Spectrum-Based Classification Model' (Master's thesis, Politecnico di Torino 2025) 1, 2.

²² *Ibid* 19.



circumstances ruling at the time, offers definite military advantage”.²³ An object therefore becomes a military objective when its utilization effectively supports military operations. This definition classifies objects in accordance with the function they exhibit in military operations rather than their ownership or civilian origin.²⁴

Military contracts for commercial satellite services are becoming customary. Furthermore, commercial satellite communication providers often lease data for military use due to military forces relying on civilian satellite imagery to monitor adversary activities, assess an operating environment and gather intelligence. For example, Maxar Technologies’ commercial satellites are used to take high-resolution images of earth for a variety of civilian purposes but have also been used to generate training models for military operations.²⁵ Here, commercial satellites supply operational military reinforcement, they meet the legal definition of a military objective, which makes them lawful targets under IHL.²⁶

The Outer Space Treaty and state responsibility

OST was first established during the 1960s.²⁷ Article VI of the OST holds states internationally responsible for national space activities, whether they are conducted by governmental or non-governmental bodies.²⁸

The traditional interpretation of Article VI attributed the activities of private actors in outer space to the State itself, thus obliging States to ensure that its space activities did not violate the OST or rules of international law; if a private actor breaches these international obligations, the potential liability for such breach is imputed to the state. In effect, acts carried out by non-governmental entities are attributable to the authorising state, which bears international responsibility for ensuring compliance with its treaty obligations.²⁹

²³ Protocol Additional to the Geneva Conventions of 12 August 1949 and relating to the Protection of Victims of International Armed Conflicts (Additional Protocol I) (adopted 8 June 1977, entered into force 7 December 1978) 1125 UNTS 3 art 52(2).

²⁴ Ibid.

²⁵ G Blair Kuplic and Jonathan Sawmiller, ‘Humanity on the Final Frontier: Challenges in Applying International Humanitarian Law to Modern Military Space Operations’ (2024) *International Review of the Red Cross* 220.

²⁶ Protocol Additional to the Geneva Conventions of 12 August 1949 and relating to the Protection of Victims of International Armed Conflicts (Additional Protocol I) (adopted 8 June 1977, entered into force 7 December 1978) 1125 UNTS 3 art 52(2).

²⁷ Sara von Bonsdorff, ‘From Satellites to Battlegrounds: Use of Outer Space for Peaceful Purposes, the Use of Force and the Right to Self-defence in the Modern Space Landscape’ (Master’s thesis, Åbo Akademi University 2024) 2.

²⁸ Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (adopted 27 January 1967, entered into force 10 October 1967) 610 UNTS 205 (Outer Space Treaty) art VI.

²⁹ Ibid.



The core paradox: targetability vs responsibility

A paradox emerges in the legal realm of armed conflict, where targetability and responsibility collide. IHL focuses on the function performed by the satellite, whereas international space law focuses on the state exercising jurisdiction and control over the activity.³⁰ To illustrate the tension between the two legal frameworks, we consider a situation involving three states. State A authorizes and supervises a private company that operates a commercial satellite providing communications and imagery. At the time of the launch, the satellite is civilian in character and used for ordinary commercial purposes. During an armed conflict, however, the armed forces of State B begin using the satellite for operational activities, such as military communications and intelligence support. The company itself does not participate in the conflict; it continues to provide services in the ordinary course of business. Nevertheless, the satellite now makes an effective contribution to military action.

Under IHL objects that effectively support military operations may be classified as military objectives and can be lawfully targeted by adversary, here State C.³¹ The legality of the attack depends on the function performed by the object rather than its ownership or civilian origin. The satellite may therefore lose its protection as a civilian object because of its military use.³² Space law, however, follows a different logic. Because State A authorized the company's activities, Article VI of the OST attributes those activities with responsibility to State A.³³ The satellite's operations are thus legally connected to the licensing state even though that state neither conducts the military operation nor controls the way the satellite is used in the conflict.

The same object therefore produces two different legal outcomes. For purposes of targeting, it is treated as part of State B's war effort. For purposes of responsibility, its activity is attributed to State A. The state whose conduct renders the satellite attackable is not the state to which the

³⁰ Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (adopted 27 January 1967, entered into force 10 October 1967) 610 UNTS 205 (Outer Space Treaty) art VI.; Protocol Additional to the Geneva Conventions of 12 August 1949 and relating to the Protection of Victims of International Armed Conflicts (Additional Protocol I) (adopted 8 June 1977, entered into force 7 December 1978) 1125 UNTS 3 art 52(2).

³¹ Protocol Additional to the Geneva Conventions of 12 August 1949 and relating to the Protection of Victims of International Armed Conflicts (Additional Protocol I) (adopted 8 June 1977, entered into force 7 December 1978) 1125 UNTS 3 art 52(2).

³² Giorgia Conte, 'Assessing the True Extent of Dual-Use Potential in Satellites Through a Spectrum-Based Classification Model' (Master's thesis, Politecnico di Torino 2025) 7.

³³ Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (adopted 27 January 1967, entered into force 10 October 1967) 610 UNTS 205 (Outer Space Treaty) art VI.



activity is legally attached. This reveals a structural inconsistency in the interchange between two regimes: targeting under IHL is determined by military function, whereas responsibility under space law is determined by jurisdictional authorization.³⁴

Structural inconsistency

Because responsibility is attributed to the licensing state rather than the military user, the legal effects of a lawful attack may fall upon a state that is not directly a party to the conflict.³⁵ States know what they can attack, who they are fighting and who they can hold accountable. Private satellites break this alignment, because two different legal systems point to two different states at the same time, and this creates critical issues. This paradox matters because it allows objects to be lawfully attacked while assigning responsibility to a different state than the one conducting the military operation, undermining neutrality and accountability in armed conflict. A neutral state may find its space infrastructure lawfully attacked because it authorized a company whose services are used by a belligerent. In international law, attacking neutral states is normally a very serious escalation, but here the law accidentally allows it.³⁶ So, the paradox risks widening a war to countries that never joined it.

Furthermore, here, responsibility is a vague notion, but law requires accountability. With commercial satellites the company did not conduct hostilities, the licensing state did not control the operation, and the military user did not own the satellite. If something goes wrong such as civilian harm, unlawful targeting or escalation in space, who is legally responsible? Space law points to one state and the law of armed conflict points to another. The result is a responsibility gap. Neutral states may therefore face a regulatory dilemma. Permitting commercial operators to provide services could increase the state's exposure to conflict-related risks, whereas stricter controls may constrain the development of the commercial space sector. Existing international law provides limited guidance on how this balance should be struck. Because satellites are shared infrastructure, if they become lawful targets, attacks in space could affect civilians

³⁴ Protocol Additional to the Geneva Conventions of 12 August 1949 and relating to the Protection of Victims of International Armed Conflicts (Additional Protocol I) (adopted 8 June 1977, entered into force 7 December 1978) 1125 UNTS 3 art 52(2).; Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (adopted 27 January 1967, entered into force 10 October 1967) 610 UNTS 205 (Outer Space Treaty) art VI.

³⁵ Ibid.

³⁶ G Blair Kuplic and Jonathan Sawmiller, 'Humanity on the Final Frontier: Challenges in Applying International Humanitarian Law to Modern Military Space Operations' (2024) *International Review of the Red Cross* 201.



globally. Therefore, the paradox lowers the legal clarity about who can be attacked and how. By imputing private satellite activities to states, space law risks entangling neutral states in armed conflicts and undermining traditional neutrality protections.

Conclusion

This article has looked at how two established bodies of international law interact when privately operated satellites are used in armed conflict. Under IHL, objects are classified according to their military function. When a commercial satellite provides communications, navigation or intelligence support to armed forces, it qualifies as a military objective and can be lawfully targeted.³⁷ At the same time, Article VI of the OST attributes the activities of private space operators to the state that licensed them. Responsibility therefore attaches to the licensing state regardless of whether it conducts or supports the military operation in which the satellite is used.³⁸

Altogether, these laws produce a structural inconsistency. The state whose military use renders the satellite attackable is not necessarily the state to which the activity is legally attributed. A privately owned satellite may thus be targeted because it assists one belligerent, while the legal consequences of that targeting fall upon a different state that is not a party to the conflict.³⁹ This disconnect challenges the coherence of the international legal framework, creates responsibility gaps, and increases the risk of escalation by exposing the infrastructure of non-belligerent states to lawful attack.⁴⁰

The issue here does not arise from the absence of law, but from the collision of two legal regimes developed for a state-centric model of warfare. Contemporary military operations, however, increasingly depend on globally distributed commercial infrastructure that neither fully belongs to states nor operates independently of them.⁴¹ International law now treats private satellites

³⁷ Protocol Additional to the Geneva Conventions of 12 August 1949 and relating to the Protection of Victims of International Armed Conflicts (Additional Protocol I) (adopted 8 June 1977, entered into force 7 December 1978) 1125 UNTS 3 art 52(2).

³⁸ Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (adopted 27 January 1967, entered into force 10 October 1967) 610 UNTS 205 (Outer Space Treaty) art VI.

³⁹ *Ibid.*

⁴⁰ Moamen Mohamed Sayed, Li Shouping and Zagra Alievna Gadzhieva, 'Interpretation and Implementation of "Peaceful Purposes" in Military Activities in Outer Space: Legal and Political Implications' (2024) 25 *Aerospace China* 37, 44.

⁴¹ Giorgia Conte, 'Assessing the True Extent of Dual-Use Potential in Satellites Through a Spectrum-Based Classification Model' (Master's thesis, Politecnico di Torino 2025) 2.



simultaneously as instruments of warfare and civilian objects.⁴² For this reason, the solution is not to create a new treaty, but rather, a clarification on how responsibility and targeting rules should be interpreted when private space companies' services are integrated into military operations. Without such clarification, the civilian-military distinction in space will continue to erode, and states could face legal consequences for conflicts in which they neither participate nor exercise effective control.

***Sofia Nüles** (2001, she/her) is a Finnish student at the Vrije Universiteit Amsterdam, where she is pursuing a master's degree in International Business Law, with a specialization in International Climate Law and Corporations. Her main areas of interest are international space law, climate law and corporate governance.*

⁴² Ibid 6.



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