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**Starlink's Dual-Use in The Ukraine-Russia Conflict: Lawful or Unlawful?
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Abstract

The use of Starlink by the Ukrainian military against the Russian military has been controversial since the use of space objects for military purposes is not permitted under the space law regime. The Seneca unit of Ukraine's 93rd Brigade uses the Starlink network to operate drones from hidden locations to avoid enemy detection. Their main task is to monitor areas near the Russian border and identify Russian military positions. These drones are also equipped with improvised explosive devices, and between August and December 2022, approximately 600 Russian soldiers were reported killed due to drone attacks. According to the United Nations Secretariat's November 2018 data, Starlink satellites are classified as spacecraft for practical applications like weather observation and communication. However, in practice, Ukraine uses Starlink for peaceful and military purposes. This research will reveal the legality of Ukraine's dual use of Starlink, the justification for self-defense, and the potential responsibility that may arise from this case. The research findings indicate that the Ukrainian military's dual use of the Starlink satellites violates international law. Despite being used for self-defense purposes; such aggressive use is not accompanied by permission from SpaceX. In addition, the dual use of the Starlink satellites could give rise to possibilities of state responsibility. The author argues that a comprehensive and specific regulation is needed to overcome future practice of dual-use space objects.

Keywords: Demilitarization, Dual-Use Satellite, Starlink, Satellite

A. INTRODUCTION

The presence of *Starlink* brings benefits to the global community, particularly Ukraine during the Russian invasion. Based on real-world events, Ukraine's internet connectivity was disrupted due to cyber-attacks by Russian authorities on *Ukrtelecom*, a state-owned

telecommunications company in Ukraine.³

In response to these events, Ukraine's Minister of Digital Transformation, Mykhailo Fedorov, reached out to Elon Musk for assistance in providing the Ukrainian people with continuous internet connectivity through the *Starlink* satellite service. This request was fulfilled by Elon

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³ Chris Vallance, "Ukraine War: Major Internet Provider Suffers Cyber-Attack", 2022, <<https://www.bbc.com/news/60854881>>.

Musk in March 2022, as he provided 11,000 *Starlink* stations to Ukraine since the Russian invasion took place.⁴

However, a new issue arises in this situation when the Ukrainian military utilizes *Starlink* as a means to launch attacks on the Russian military using drones connected through the *Starlink* communication network. Meanwhile, according to data released by the United Nations Secretariat in the document *Registration Data on Space Launches by the United States of America for November 2018 ST/SG/SER.E/924*, the status of various types of *Starlink* satellites is described as *spacecraft engaged in practical applications and uses of space technology, such as weather observation or communication purposes*.⁵

Article III of the Outer Space Treaty states that the utilization of outer space, including the moon and celestial bodies, must be directed towards the peaceful and secure advancement of humanity. Additionally, Article IV of the Outer Space Treaty asserts that participating nations agree not to place nuclear weapons or other weapons of mass destruction in Earth's orbit. Likewise, these nations are prohibited from placing weapons on celestial bodies or in outer space through any means. The article further outlines prohibitions against establishing military bases, installations, fortifications, weapon testing, and conducting military maneuvers in outer space. Hence, military activities in space, including the use of satellites for purposes causing harm to Earth's society such as warfare, weapon testing, and military maneuvers in space, are generally forbidden except for military activities

aimed at scientific research, as stipulated in Article IV paragraph 2 of the Outer Space Treaty.

The usage of the *Starlink* network for drone operations is carried out by a unit within the Ukrainian 93rd Brigade, known as Seneca. The Seneca unit coordinates drones from underground spaces to avoid enemy detection. Their primary task involves monitoring areas near the Russian border and identifying the positions of Russian military forces. As previously mentioned, the Seneca unit employs two types of drones. The *DJI Matrice 30T*, equipped with a thermal camera, conducts nighttime observations, while the *DJI Mavic 3 Quadcopter* performs basic observations during mornings and afternoons, flying at distances of about one to two kilometers from Russian territory. In terms of defense or offense, these drones are also outfitted with improvised explosive devices. Between August and December 2022, approximately 600 Russian soldiers were reported to have been killed due to drone attacks.⁶

Not only the regular Ukrainian military but also the volunteer-formed drone unit called Aerorozvidka utilizes *Starlink* connections for drone coordination. Aerorozvidka has conducted several drone attacks on the Russian military through the *Starlink* network. A week after the invasion began, Russia sent a large force, leading to a 64-kilometer-long convoy heading towards Ukraine. However, Aerorozvidka successfully thwarted the convoy by firing 1.5-kilogram anti-tank grenades at vehicles in the front line, causing a traffic jam within the convoy.⁷ Aerorozvidka utilizes *Starlink* to establish communication between its drone teams

⁴ Martin Sussex, "Putin's War in Ukraine: Missteps, Prospects, and Implications", *Australian Journal of Defence and Strategic Studies*, Vol. 4, No. 1, 2022, p. 94.

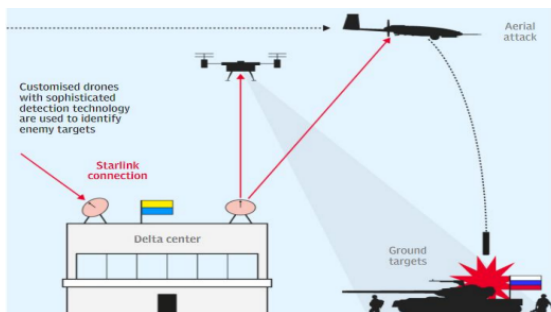
⁵ United Nations Office for Outer Space Affairs, "Registration Data on Space Launches by the United States of America for November 2018 ST/SG/SER.E/924", 2018, <<https://www.unoosa.org/oosa/en/osoindex/data/documents/us/st/stsgser.e924.html>>.

⁶ Sam Skove, "How Elon Musk's *Starlink* is Still Helping Ukraine's Defenders", *defenseone.com*, 2023,

<<https://www.defenseone.com/technology/2023/03/black-swan-Starlinks-unexpected-boon-ukraines-defenders/383514/>>.

⁷ Julian Borger, "The Drone Operators Who Halted Russian Convoy Headed for Kyiv", 2022, <<https://www.theguardian.com/world/2022/mar/28/the-drone-operators-who-halted-the-russian-armoured-vehicles-heading-for-kyiv>>.

and artillery units. In addition, Starlink is also beneficial during nighttime reconnaissance operations, as it facilitates the use of thermal vision, enabling effective target acquisition.⁸



Picture 1 Illustration of Starlink Usage by the Aerorozvidka Unit⁹

Besides supporting civilian communication, Starlink also benefits the agricultural sector by enabling Ukrainian farmers to monitor key indicators like soil moisture, temperature, and vegetation through its satellite-based remote sensing technology.¹⁰ In other words, *Starlink* is a dual-use space object, capable of serving both civilian and military purposes. This matter warrants discussion, given that as an international organization, the United Nations must ensure that registered space objects adhere to the principles of international space law, particularly those related to global security and peace.¹¹ Furthermore, this situation raises an issue because the Registration Convention does not address regulations concerning the alteration of functions of a space object.

The concept of dual-use lacks a consistent definition in literature, reflecting inconsistencies over the past decades. In most international regulations, particularly

regarding non-proliferation, the term "dual-use" is replaced by phrases like civilian versus military purposes, peaceful versus non-peaceful purposes, or benevolent versus malevolent purposes.

In the context of most international legal frameworks, particularly those concerning "*non-proliferation*", the term dual-use is frequently substituted with more specific dichotomies such as "*civilian versus military purposes*", "*peaceful versus non-peaceful purposes*", and "*benevolent versus malevolent purposes*".¹² As noted by John Forge in his article "A Note on the Definition of Dual Use", one of the principal challenges in establishing a clear definition of dual-use arises from its application to a wide range of entities—including technologies, objects, research, products, facilities, and artifacts—each of which varies significantly in terms of function and intended use.

In the realm of international humanitarian law, the notion of dual-use is implicitly addressed in Article 52 of Additional Protocol I, which distinguishes between Civilian Objects and Military Objectives. Paragraph 3 of the article acknowledges the existence of dual-use, stating that when there is doubt regarding whether an object serves both civilian purposes and provides military advantage, it can no longer be classified as a civilian object.

Kathleen Walsh expands the concept by referring to "dual-use technologies", technologies intended for both peaceful commercial purposes and military or security functions.¹³ According to Walsh, the broad definition of dual-use technology highlights that technology itself

⁸ Lavinu Bojor, et al., "Emerging Technologies in Conflict: The Impact of Starlink in the Russia - Ukraine War", *Land Forces Academy Review*, Vol. XXIX, No. 2, p. 186

⁹ Gigazine. "Reports That Ukraine has Begun to Use Starlink for 'Anti-Tank Bombing'", <https://gigazine.net/gsc_news/en/20220322-starlink-helping-ukraine-win-drone-war/>.

¹⁰ Lavinu Bojor, et al., *Op.Cit.*, p. 187.

¹¹ Yasuo Otani, et al., "Dual-Use Concept on Civil and Defense Uses of Outer Space", *Transactions of the Japan Society for Aeronautical and Space Sciences*, Vol. 10, 2012, p.1.

¹² Johannes Rath, et al., "Evolution of Different Dual-Use Concepts in International and National Law and Its Implications on Research Ethics and Governance", *Science and Engineering Ethics*, Vol 20, No. 3, 2014, p. 770.

¹³ Kathleen A. Walsh, "The Role, Promise, and Challenges of Dual-Use Technologies in National Defense", in Richard A. Bitzinger, *The Modern Defense Industry*, California: ABC-CLIO, 2009, p. 123.

is an independent variable, while the intent of its user determines its purpose. In a globalized world, these technologies serve both civilian and military needs, emphasizing their critical importance to users. However, Walsh notes that this dual nature also introduces risks, making it essential for leaders, policymakers, and defense officials to carefully manage these challenges in contemporary contexts.

Discussing the dual-use issue of the *Starlink* satellite, it is also linked to matters of responsibility and state attribution due to the effects arising from the Ukrainian military's utilization of the *Starlink* satellite, which relates to international security. As outlined in Article VI of the Outer Space Treaty, it stated that all space activities conducted by both governmental and non-governmental entities are entirely the responsibility of the state. In the case of the *Starlink* satellite, the United States, as a state party of the Outer Space Treaty such stated in the Article IV is the responsible state for all *SpaceX* activities. Furthermore, on February 9, 2023, during the Federal Aviation Administration Conference, Gwyne Shotwell, who serves as the President and COO of *SpaceX*, affirmed that from the outset, *SpaceX* had no intention of sending *Starlink* routers to Ukraine for purposes of weaponization or offensive use, such as controlling drones to target the Russian military.¹⁴

Shotwell also stated that the contract between *SpaceX* and the Ukrainian Government does not include provisions for using the *Starlink* network offensively. This gives rise to a dilemma concerning whether the assignment of responsibility from *SpaceX* as a private company to the United States as the Launching and Registering State remains applicable according to the guidelines outlined in Article VI of the Outer Space Treaty. This issue is rooted in the fact that *SpaceX* does not approve of the

employment of *Starlink* satellites for offensive actions by the Ukrainian military.

Therefore, this article will delve into the legality of employing *Starlink* satellites as dual-use space objects by the Ukrainian Military within the framework of international law. Additionally, the article will also explore the implementation of state responsibility that could arise from the dual-use application of the *Starlink* satellites.

B. The Status of *Starlink* Satellite

According to data released by the United Nations Secretariat through the report Registration Data on Space Launches by the United States of America for November 2018 (ST/SG/SER.E/924), the status of *Starlink* satellites is described as "spacecraft engaged in practical applications and uses of space technology such as weather or communications." This classification emphasizes the versatile role of *Starlink* in facilitating essential technological services, including communication infrastructure in various scenarios.

The initial purpose behind the deployment of *Starlink* routers in Ukraine was to support civilian needs related to communication and information during the ongoing conflict between Ukraine and Russia. With its technological advantages, *Starlink* offered a crucial solution for uninterrupted internet access, providing citizens with a lifeline for communication during periods of disruption.¹⁵ As the conflict escalated, traditional communication systems were increasingly compromised, making *Starlink's* presence essential for facilitating emergency services, healthcare delivery, financial operations, and even energy-related infrastructure.

¹⁴ CNN, "SpaceX Admits Blocking Ukrainian Troops from Using Satellite Technology", 2023, <<https://edition.cnn.com/2023/02/09/politics/spaceX-ukrainian-troops-satellite-technology/index.html>>.

¹⁵ Robin Dickey, Michael P. Gleason, "Space and War in Ukraine: Beyond the Satellites", *Spacepower and Strategy*, Vol. 3, No. 1, 2024.

Irpin, a region severely impacted by Russian military aggression, suffered significant damage to its local infrastructure, including the collapse of communication networks.¹⁶ A critical issue was the destruction of 24 cellular towers, which rendered radio and mobile communication systems inoperable.¹⁷ This sudden breakdown left the city isolated, with residents unable to contact their families or access emergency services.¹⁸ The absence of a functioning communication system in Irpin exacerbated the challenges faced by citizens already struggling with the consequences of the war.

Recognizing the need for urgent action, Vodafone Ukraine engineers stepped in to restore connectivity.¹⁹ On March 31, 2022, these engineers installed a receiver and motorized base station equipped with fiber-optic networks on the outskirts of Irpin. This infrastructure enabled the operation of a device provided by SpaceX called 'Dishy McFlatFace,' a Starlink receiver specifically designed for high-speed satellite internet access.²⁰ Within a few hours of installation, the internet and mobile networks in Irpin were fully restored.²¹

The restoration of communication infrastructure had an immediate and positive impact on the well-being of Irpin's residents. As soon as the networks were operational, people reconnected with their families and friends, providing much-needed updates on their safety and well-being.

In addition to its use for communication-civilian purposes, Starlink also brings significant benefits to the agricultural sector. Its satellite-based internet allows Ukrainian farmers to accurately and efficiently monitor key agricultural indicators—such as soil moisture, temperature, and vegetation—through Starlink's remote sensing technology.²²

C. Inconsistency Between the Function of *Starlink* Satellites in Registration Data and Their Dual-Use by the Ukrainian Military

In addition to civilian use, *Starlink* services in Ukraine have also provided significant military advantages in confronting Russian forces.²³ The first military use of *Starlink* facilities was reported by The Telegraph on March 18, 2022. The report revealed that Ukrainian military forces began operating drones to track Russian military positions using *Starlink*.²⁴ These drones were equipped with *Starlink* terminals, enabling fast satellite internet connectivity.²⁵ The drones used included DJI Mavic 3 Quadcopter and DJI Matrice 30T, which provided reliable communication to support military operations. The effectiveness of these operations was further emphasized in an interview conducted by British journalist David Patrikarakos with a Ukrainian soldier in Dnipro, who stated that *Starlink* had transformed the war to Ukraine's advantage.²⁶

¹⁶ Inesa Kostenko, Andrii Manzhula, "From Space to the Battlefield: Ethical and Legal Aspects of Use of Satellite Technologies in the Russian-Ukrainian War", *Philosophy and Cosmology*, Col. 34, p. 7.

¹⁷ *Ibid.*

¹⁸ Andrew Radin, *et al.*, "Lesso from the War in Ukraine for Space", *RAND Research Report*, p. 2.

¹⁹ Tom Simonite. "How Starlink Scrambled to Keep Ukraine Online", <<https://www.wired.com/story/starlink-ukraine-internet/>>.

²⁰ *Ibid.*

²¹ Strategeast, Ukrainian Digital Resistance to Russian Aggression Report, <https://www.strategeast.org/all_reports/Ukrainian_Digital_Resistance_Report_web.pdf>.

²² Laviniu Bojor, *et al.*, *Op.Cit.*, p. 187.

²³ Dominika Kunertova, "The Ukraine Drone Effect on European Militaries", *Policy Perspectives*, Vol. 10, No. 15, 2022, p. 3.

²⁴ Kaushik Ray & William Selvamurthy, "Starlink's Role in Ukraine: Portent of a Space War?", *Journal of Defence Studies*, Vol. 17, No. 1, 2023, p. 27.

²⁵ Sam Skove. "How Elon Musk's Starlink is Still Helping Ukraine's Defenders". *defenseone.com*, <<https://www.defenseone.com/technology/2023/03/black-swan-Starlinks-unexpected-boon-ukraines-defenders/383514/>>.

²⁶ Kaushik Ray & William Selvamurthy, *Op.Cit.*, at.27

Seneca Unit of Ukraine's 93rd Brigade has the primary mission of monitoring areas near the Russian border and identify Russian military positions.²⁷ As previously mentioned, two types of drones were used. The DJI Matrice 30T, equipped with thermal cameras, was deployed for nighttime surveillance. The DJI Mavic 3 Quadcopter was used for basic reconnaissance during morning and daytime operations, typically flying one to two kilometers from Russian positions. To enhance their offensive capabilities, these drones were also equipped with jury-rigged bombs. From August to December 2022, these drone operations resulted in 600 Russian soldiers being killed.²⁸

In addition to regular Ukrainian military forces, Aerorozvidka, a specialized drone unit formed by Ukrainian IT volunteers, also utilized *Starlink* connectivity. Aerorozvidka has been operating alongside the Ukrainian Armed Forces since February 2022, coordinating between drone units and artillery teams through the *Starlink* network.²⁹ This network also proved valuable for nighttime reconnaissance, as it enabled thermal vision, which enhanced target acquisition capabilities.³⁰ Aerorozvidka has launched several drone attacks against Russian forces using *Starlink*-connected drones. One notable operation occurred during the first week of Russia's invasion, when the Russians deployed a 64-kilometer-long military convoy advancing toward Ukraine.

According to *SpaceX* President and Chief Operating Officer, Gwynne Shotwell,

the *Starlink* internet service in Ukraine was never intended to be weaponized.³¹ This is consistent with all registration data submitted by the UN Secretariat, which states that *Starlink* satellites are registered as "spacecraft engaged in practical applications and uses of space technology such as weather or communications," as seen in the Registration Data on Space Launches by the United States of America for November 2018 ST/SG/SER.E/924.³²

Moreover, the Ukrainian military's use of *Starlink* for offensive purposes poses a threat to *SpaceX*, as Russia has expressed intent to destroy the satellites, considering them a destabilizing factor in the ongoing conflict.³³

D. The Legality of the Ukrainian Military Conduct Under International Law

Diederiks-Verschoor argues that dual-use satellites are a controversial space subject, with two functions: for peaceful purposes, as outlined in the UN Charter, and for military purposes in emergency situations.³⁴ Diederiks-Verschoor's opinion focuses on the military purpose of dual-use space objects, specifically their use in emergency situations. A country is considered to be in a state of emergency when it is under threat and facing urgent circumstances. Emergency situations, in this context, include war/military emergencies, natural disasters, and financial crises.³⁵ Additionally, Ukraine declared a state of emergency through the Decree of the President of Ukraine No. 64/2022. The decree stated that the reason for declaring

²⁷ Andrew Radin, *et. al.*, *Op.Cit.*, p.13.

²⁸ Sam Skove, *Op.Cit.*

²⁹ Charlie Parker, "Specialist Ukrainian Drone Unit Picks Off Invading Russian Forces as They Sleep", <<https://www.thetimes.co.uk/Pasal/specialist-drone-unit-picks-off-invading-forces-as-they-sleep-zlx3dj7bb>>.

³⁰ Gigazine, "Reports That Ukraine has Begun to Use *Starlink* for 'Anti-Tank Bombing'", <https://gigazine.net/gsc_news/en/20220322-Starlink-helping-ukraine-win-drone-war/>.

³¹ James FitzGerald, "Ukraine War: Elon Musk's *SpaceX* Firm Bars Kyiv from Using *Starlink* Tech for Drone Control", <<https://www.bbc.com/news/world-europe-64579267>>.

³² United Nations Office for Outer Space Affairs, "Registration Data on Space Launches by the United States of America

for November 2018 ST/SG/SER.E/924", <<https://www.unoosa.org/oosa/en/osoindex/data/documents/us/st/stsgser.e924.html>>.

³³ Michelle Codiva, "Russia Allegedly Wants to Destroy Elon Musk's *Starlink* Satellites, Here's Why", <<https://www.sciencetimes.com/Articles/40008/20220919/russia-allegedly-destroy-elon-musks-Starlink-satellites-heres-why.htm>>.

³⁴ Diederiks-Verschoor & V. Kopal, *An Introduction to Space Law*, 3rd Revised Edition, New York: Kluwer Law International, 2008, p. 83.

³⁵ Muhammad Syarif Nuh, "Hakekat Keadaan Darurat Negara (*State of Emergency*) sebagai Dasar Pembentukan Peraturan Pemerintah Pengganti Undang-Undang", *Jurnal Hukum*, Vol. 18, No. 2, 2011, p. 233.

a state of emergency was to respond to Russia's escalating aggression toward Ukraine. The Ukrainian military's use of *Starlink* demonstrates the occurrence of dual-use, as the satellite fulfilled military purposes in the emergency situation, as described by Diederiks-Verschoor.

The discussion regarding dual-use space objects needs to be linked to the principle of space demilitarization as outlined in the Outer Space Treaty, particularly in Article IV. Article IV, paragraph (1) states that countries are prohibited from placing any weapons, whether nuclear or otherwise, in orbit around the Earth. Additionally, Article IV, paragraph (2) asserts that the use of the Moon and other celestial bodies is restricted to peaceful purposes, which includes scientific research. Prohibited activities include the establishment of military bases, installations, fortifications, weapons testing, and military maneuvers involving celestial bodies.

In this context, the writer emphasizes the term "military maneuvers" concerning celestial bodies. The Space Treaties do not provide further explanation or a definition of military maneuvers. The author refers to the Cambridge Dictionary, which defines military maneuvers as "a planned and controlled movement or operation by the armed forces for training purposes and in war". Based on this definition, it can be concluded that military maneuvers on celestial bodies involve utilizing celestial bodies for training or military purposes during wartime, operated by armed forces.

On the other hand, *Starlink* satellites have been used by the Ukrainian military in the war against Russia, both for defensive and offensive operations against Russian forces. Although satellites are considered part of celestial bodies, *Starlink* satellites are not classified as celestial

bodies. Celestial bodies include natural space objects or satellites that orbit a planet, such as the Moon orbiting Earth. In contrast, *Starlink* is a man-made satellite. The term "man-made space object" is also mentioned in Article 3 paragraph (2) of the Moon Agreement, which states:

"Any threat or use of force or any other hostile act or threat of hostile act on the Moon is prohibited. It is likewise prohibited to use the Moon in order to commit any such act or to engage in any such threat in relation to the Earth, the Moon, spacecraft, the personnel of spacecraft or man-made space objects."

However, the phrase "in relation to..." in this provision does not refer to the direct use of a man-made space object. Rather, it refers to the prohibited use of the Moon as a platform to carry out acts of threat, force, or hostility directed at man-made space objects, including satellites. Therefore, the author argues that this article is not appropriate to be applied in the case of *Starlink's* use.

The Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space (1963) outlines principles that states must follow in their space exploration activities. One of the key principles in this declaration states that "The activities of States in the exploration and use of outer space shall be carried on in accordance with international law, including the Charter of the United Nations, in the interest of maintaining international peace and security and promoting international cooperation and understanding".³⁶ In essence, all space exploration activities must adhere to international law, including the UN Charter. This emphasizes the importance of conducting space activities in a manner that promotes peace, security, and cooperation among nations.

³⁶ United Nations General Assembly, Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space, A/RES/1962(XVIII)

Article 1 paragraph (1) of the United Nations Charter states one of the purposes of the UN, namely to take effective measures for the prevention and removal of threats to peace, and for the suppression of acts of aggression or other breaches of the peace.³⁷ The phrase “suppression of acts of aggression or other breaches of the peace” indicates that acts of aggression are considered violations of peace. Based on this, the author argues that peaceful purpose in the context of the demilitarization of outer space refers to activities that do not involve any element of aggression in their implementation.

However, in determining whether an action constitutes aggression that violates international law, further analysis is required to assess whether the act of aggression was carried out as a form of self-defense or not. Referring to Diederiks-Verschoor’s, dual-use space objects for military purposes are used in emergency situations, specifically when a country declares a state of emergency. The author links the term “emergency” to the principle of self-defense recognized under international law, particularly Article 51 of the United Nations Charter, which allows states to take necessary measures in response to an armed attack. This connection suggests that the deployment of dual-use technologies, such as satellite-based communication or reconnaissance systems, may be legally justified if conducted within the framework of defending a state's sovereignty and territorial integrity. Therefore, the classification of an act as aggression must be carefully evaluated in light of whether it falls within the legal boundaries of self-defense under international law.

According to the principle of self-defense, each UN member state may exercise the right to self-defense in the event of an emergency such as war or

invasion by another country. This right to self-defense can be exercised through armed or unarmed measures, provided certain conditions are met. The legitimate conditions for invoking the right to self-defense are as follows:³⁸

1. There is an imminent threat or prior attack from another country.
2. The UN Security Council has not yet issued any measures or policies regarding the threat or attack.
3. There is no other viable alternative.
4. The action is taken immediately.

In this case, the author will first focus on the event where Ukrainian drones attacked a Russian military convoy heading to Ukraine, which occurred a week after the invasion began. The attack was carried out on urgent grounds, as the convoy reported to be around 64 kilometers long was composed of thousands of Russian troops and military equipment advancing toward Kyiv, posing an imminent threat to Ukraine’s capital. According to satellite imagery and multiple intelligence reports published by international media outlets such as CNN and The New York Times, the convoy consisted of tanks, artillery, and logistical vehicles, indicating a large-scale ground offensive. The Ukrainian military’s decision to target the convoy using drones, including those supported by Starlink-enabled communication, can be interpreted as a defensive measure aimed at delaying or disrupting a direct military assault.

The UN Security Council’s policies were considered ineffective in addressing the conflict, as Russia itself is a permanent member of the Security Council. Given this, the author argues that Russia’s position as a permanent member of the Security Council posed a threat and a negative impact on Ukraine’s standing in the conflict, leaving Ukraine with no other choice but to use

³⁷ Article 1 paragraph (1) United Nations Charter

³⁸ Yaroslav Shiryayev, “The Right of Armed Self-Defense in International Law and Self-Defense Arguments Used in

Second Lebanon War”, *Acta Societatis Martensis*, Vol. 3, Issue 1, 2008, p. 82.

military force to counter the threat. In this context, the author argues that Starlink's dual-use capabilities—particularly its real-time, high-speed communication infrastructure enabled Ukraine to coordinate drone strikes with greater precision, timing, and situational awareness. This was particularly critical during the early stages of the war, such as the drone strike on the Russian military convoy, where conventional communication systems had been compromised or rendered inoperable. Thus, the use of dual-use satellite technology was not merely incidental, but rather a decisive element in enabling Ukraine to respond effectively and proportionally to an imminent military threat.

Based on these points, disregarding the fact that Ukraine is neither the launching state nor the owner of *Starlink*, Ukraine's claim of self-defense aligns with international law provisions, particularly under Article 51 of the United Nations Charter. However, regarding the ownership status of *Starlink*, the author argues that such actions are not justified under space law regulations for offensive purposes. Additionally, this action could be detrimental to *SpaceX* if the *Starlink* satellite used by Ukraine becomes a target for Russian attacks. Therefore, in the following section, the author will analyze the discrepancy between the *Starlink* satellite's registered function and its current use.

Regarding whether the use of dual-use space objects is justified under international law, the author cites the People's Republic of China, which has two satellite systems with dual uses: BeiDou and Yaogan. In registration data available at the United Nations Secretariat, neither satellite explicitly states a military function. Yaogan-9, launched in 2010, essentially has a

military function for the People's Liberation Army (PLA). However, in the registration data numbered ST/SG/SER.E/649, the function of that object is listed as "Remote Sensing." Similarly, BeiDou, which is also intended for the PLA's interests, is described in the registration ST/SG/SER.E/566 as having the function of "Navigation and Positioning".³⁹ This has also been evidenced in a study by Ram S. Jakhu, Bhupendra Jasani, and Jonathan C. McDowell titled "Critical issues related to registration of space objects and transparency of space activities." The research states that the functional requirements in space object registration are most frequently misused by countries, especially concerning military functions.⁴⁰

Moreover, the other countries like United Kingdom and Netherlands openly register space objects for military purposes, such as the Skynet 5D satellite by the United Kingdom and the BRIK II satellite by the Netherlands. Both satellites have been registered with the United Nations Secretariat, with Skynet 5D listed as ST/SG/SER.E/690 and BRIK II as ST/SG/SER.E/1030. The Skynet 5D satellite serves as a military communication satellite used by military forces in the battlefield and peacekeeping missions. According to the registration data for Skynet 5D, its function is described as "Skynet 5D provides secure military communications capability at super-high frequency and ultra-high frequency to British armed forces and friendly nations." The BRIK II satellite was launched as a test for the first Dutch military nanosatellite, which aligns with its status in the registration data as a "Demonstration satellite for military purposes".

At first glance, there appears to be a difference between *Starlink* and the previously mentioned dual-use satellites. *Starlink* was fundamentally created for civilian purposes but does not preclude any

³⁹United Nations Office for Outer Space Affairs, "Registration Data on Space Launches by China for March 2010 ST/SG/SER.E/649, <<https://www.unoosa.org/documents/pdf/ser649E.pdf>>.

⁴⁰ Ram S. Jakhu, et.al, "Critical Issues Related to Registration of Space Objects and Transparency Of Space Activities", *Acta Astronauticam*, Vol. 143, 2018, p. 411.

party from utilizing the satellite for military interests, as evidenced by the actions of the Ukrainian military. In contrast, satellites like BeiDou and Yaogan were explicitly intended for military purposes from the beginning. However, the author sees a similarity: the discrepancy between the stated function and actual use, indicating that these satellites do not fulfill the objectives of the Registration Convention.

The author also relates this to the first Gulf War, which involved the massive use of commercial satellites. One such example is INMARSAT (International Maritime Satellite Organization), an international organization that provides commercial satellites for its member states.⁴¹ As a member of INMARSAT and a party to the Convention on the International Maritime Satellite Organization (INMARSAT Convention), the United States is obliged to comply with the provisions contained therein. Furthermore, the INMARSAT Convention also refers to the Outer Space Treaty. Article 3 states that the Organization (INMARSAT) must strive to serve or provide for all areas needing maritime communications. It is also stated that the purpose of INMARSAT is to act for peaceful purposes.

Concerning military use during the Gulf War, the United States fundamentally relied on United Nations Security Council Resolution 678. In that resolution, the UN instructed its member states to form a coalition with Kuwait, the country invaded by Iraq, to create international peace and security. This coalition included 39 countries, with the United States leading.

The resolution stated in the point 2:

“Authorizes Member States cooperating with the Government of Kuwait, unless Iraq on or before 15 January 1991 fully implements, as set forth in paragraph 1 above, the above-mentioned resolutions, to use all necessary means to uphold and

implement resolution 660 (1990) and all subsequent relevant resolutions and to restore international peace and security in the area”.⁴²

With this resolution from the UN Security Council, the provisions for the demilitarization of outer space could be set aside, as the use of INMARSAT satellites was aimed at creating a climate of peace. Thus, the United States and INMARSAT member states involved in the conflict did not violate outer space law provisions, particularly Article IV of the Outer Space Treaty.

By comparing the use of INMARSAT and *Starlink*, it is evident that both possess dual-use characteristics. Additionally, the dual purposes of each satellite are based on the rationale of creating international peace. However, the distinction between the two lies in the ‘consent’ held by the satellite owners. The use of INMARSAT satellites by the United States and its coalition during the Gulf War was authorized by INMARSAT, as outlined in Articles 3(2) and (3) of the INMARSAT Convention. In contrast, *Starlink* was utilized by the Ukrainian military without permission from *SpaceX* or the United States.

Based on these points, the author argues that the use of dual-use space objects is permissible under international law if it meets several criteria. The first criterion is that the space object must be registered with the United Nations Secretariat with a clear status, specifically detailing its military and civilian functions. The second criterion is that the space object must not be used for aggressive activities, as stipulated in Articles 1 and 3 of UN General Assembly Resolution 3314 (XXIX). Aggressive use of a space object is sanctioned under international law if conducted for the purpose of creating international peace. However, in the case of the Ukrainian military's use of *Starlink*

⁴¹ International Institute for Strategic Studies, “The Global Spread of Dual-Use Technology”, *Strategic Survey*, Vol. 95, Issue 1, 1994, p. 35.

⁴² United Nations Security Council Resolution 678, 29 November 1990.

satellites, it does not comply with the registration provisions stated in the Registration Convention, particularly regarding the functions of the registered space object. Moreover, Ukraine also lacks authorization from *SpaceX* for aggressive use.

E. The Possibility of Imposing State Liability to The Ukrainian Military

In the context of space law, the application of liability particularly under the Liability Convention, is generally limited to cases where a state causes damage or harm to another state. This raises the question of how responsibility is applied in situations where a state violates space law without causing actual or immediate harm to other states. Examples include the illegal deployment of weapons in space or the military use of space objects.

On the other hand, Frans von der Dunk argues that the principle of International State Responsibility in space law shares fundamental similarities with general principles of international law.⁴³ According to this view, a state can still be held internationally responsible for violating space law obligations, even if no damage or harm has yet occurred. This emphasizes the importance of preventive accountability, ensuring that states comply with space law obligations to avoid potential future harm.

Ukrainian Responsibility Towards Russia

The attack carried out by the Ukrainian military along with the Aerorozvidka unit against the lengthy Russian convoy using drones has certainly caused significant losses for Russia. The drones, coordinated through *Starlink* internet facilities, resulted in Russia losing approximately 1,000 tanks, 2,400 other military vehicles, 10,000 personnel, and dozens of supply trucks carrying food, fuel, and ammunition.⁴⁴

According to the author, the principle of responsibility in space law that is most relevant to this situation is liability based on fault, as stipulated in Article II and Article IV paragraph (1) letter (b) of the Liability Convention. According to these articles, a state's liability will be attributed to the state that causes damage or due to the fault of individuals for whom it is responsible. Although Ukraine is not a launching state, it can be considered a party that caused damage to the Russian military. Furthermore, Ukraine also violated the principle of demilitarization of outer space as outlined in Article IV of the Outer Space Treaty by using the *Starlink* satellite as a means to conduct the attack.

However, if we refer to Articles 20 to 25 of the Articles on Responsibility of States for Internationally Wrongful Acts (ARSIWA), there are several factors considered as exceptions to state responsibility, including consent, self-defense, countermeasures in respect of an internationally wrongful act, force majeure, distress, and necessity. Specifically, Article 21 of ARSIWA states that self-defense is one of the grounds that can exclude state responsibility. According to this article, an act cannot be regarded as a wrongful act causing state liability if it was performed for the purpose of self-defense.⁴⁵

It has been concluded earlier that Ukraine's actions in attacking the Russian military convoy with drones met the criteria for self-defense, namely: there was a prior threat from Russia, no action or policy had been taken by the UN Security Council, there were no other alternatives available, and the response was immediate. The application of self-defense was also due to Ukraine's status as a State of Emergency, which forced the country to use force to protect its national security. Disregarding the use of *Starlink* internet to operate the drones, the author concludes that Ukraine

⁴³ Frans von der Dunk, *Handbook of Space Law*, United Kingdom: Edward Elgar Publishing, 2015, p. 366.

⁴⁴ Claire Press & Svitlana Libet. "How Russia's 35-mile Armoured Convoy Ended in Failure". <<https://www.bbc.com/news/world-europe-64664944>>.

⁴⁵ Article 21 ARSIWA.

cannot be held liable to Russia for the attack on the convoy on the grounds that Ukraine was exercising its right to self-defense.

U. S. Responsibility Towards Russia

Referring to Article VI of the Outer Space Treaty, the States Parties to the convention must bear responsibility for national activities in outer space, including activities conducted by non-governmental entities such as private companies. Then, Article II of the Liability Convention states that “A launching State shall be absolutely liable to pay compensation for damage caused by its space object on the surface of the Earth or to aircraft in flight”. Based on this provision, the launching state is absolutely responsible for damages occurring to another state or to aircraft in flight.⁴⁶ The definition of a Launching State according to Article I (c) of the Liability Convention is a state that launches or finances the launch of a space object and the state in whose territory the launch occurs.⁴⁷

As the State of Registry for the *Starlink* satellite and the registered country of *SpaceX*, the United States holds responsibility for all activities conducted by *SpaceX* in outer space, which includes operations related to the *Starlink* satellite. Moreover, based on data compiled by the author, all *Starlink* satellite launches are conducted using Falcon 9 rockets from within the United States.⁴⁸ This section will relate to the content of the Liability Convention because the United States meets the criteria as a launching state as stipulated in Article I (c) of the Liability Convention.

The attack conducted by the Ukrainian military through drones connected to the *Starlink* network indirectly makes the United States (through *SpaceX*) a party that caused losses to Russia in the

incident involving the Long Convoy Attack towards Kyiv. Article I (a) of the Liability Convention mentions that damage includes loss of life, personal injury, loss, or damage to property of states and international organizations. Therefore, based on this article, Russia has suffered damage that includes the loss of tens of thousands of soldiers, thousands of combat equipment, and various supplies.⁴⁹

In a previous section, the author cited a statement made by *SpaceX* indicating that the delivery and provision of *Starlink* internet access to Ukraine were solely intended as humanitarian support for civilians and not for military purposes.⁵⁰ The role of the United States as a launching state makes this situation relevant to the concept of absolute liability. The author contends that although the space object (*Starlink*) indirectly caused harm to Russia, the act of dual-use of *Starlink* through the attack on the Russian convoy was entirely an action taken by the Ukrainian military. Furthermore, *SpaceX* has stated from the beginning that *Starlink* is intended only for civilian purposes. Additionally, drones generally require a Wi-Fi or internet connection to extend their flight range.⁵¹

Thus, from the perspective of the United States and *SpaceX*, it cannot be said that there was negligence or a breach of international legal obligations. *SpaceX* also cannot be said to have lost control over the functioning of *Starlink* as a communication satellite, as stated in Article VIII of the Outer Space Treaty that said:

“A State Party to the Treaty on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object, and over any personnel thereof, while in outer space or on a celestial body. Ownership of objects launched into outer

⁴⁶ Article II Liability Convention.

⁴⁷ Article I (c) Liability Convention.

⁴⁸ *SpaceX*. “Launches”, <https://www.spacex.com/launches/>.

⁴⁹ Claire Press & Svitlana Libet, “How Russia’s 35-mile Armoured Convoy Ended in Failure”, <https://www.bbc.com/news/world-europe-64664944>.

⁵⁰ James FitzGerald, *Op.Cit.*

⁵¹ Antonio Guillen, *et.al.*, “WiFi Networks on Drones”, 2016 ITU Kaleidoscope Academic Conference, 2016, p. 5.

space, including objects landed or constructed on a celestial body, and of their component parts, is not affected by their presence in outer space or on a celestial body or by their return to the Earth. Such objects or component parts found beyond the limits of the State Party to the Treaty on whose registry they are carried shall be returned to that State Party, which shall, upon request, furnish identifying data prior to their return".⁵²

This provision clarifies that the United States retains legal jurisdiction and control over Starlink satellites, as the State on whose registry the satellites are recorded. However, "control" in this legal context does not equate to active operational regulation over every instance of end-user activity, especially when the service in question — i.e., internet access — is provided via open-access commercial technology. Moreover, there is no legal requirement under the OST or other binding space law instruments obligating the launching state or private operator to monitor or restrict the military or non-military uses of internet bandwidth once it is made publicly or commercially accessible. The functional control of the satellite remains with SpaceX; it has not relinquished ownership or command authority, as required by Article VIII. Therefore, the use of the signal by Ukraine's military does not imply loss of control by the United States or SpaceX.

This is based on several reasons. First, the internet is a facility that can be accessed by the public if they have access or a subscription. On the other hand, SpaceX provided *Starlink* internet facilities to Ukraine for free as assistance against the Russian invasion. In other words, the *Starlink* internet facility is open to all sectors in Ukraine, including the Ukrainian military. Second, the types of drones used by the Aerorozvidka Unit and the Ukrainian military in attacking the Russian convoy (DJI

Mavic 3 Quadcopter & DJI Matrice 30T) are commercially available products. These two drones require an internet connection, either through Wi-Fi or cellular service, to extend their flight range.⁵³

Therefore, the author concludes that the Ukrainian military does not require authorization or approval from SpaceX to use its internet network since the network is open. Additionally, SpaceX has never intended to use *Starlink* as a weapon in Ukraine as stated by Gwyne Shotwell (COO of SpaceX). Thus, based on these points, the author also concludes that the United States is not responsible for Russia's losses in the incident of the convoy attack by the Ukrainian military.

Responsibility of Ukraine towards the United States

The natural function of *Starlink* satellites is as communication satellites that provide internet connectivity. However, the actions of the Ukrainian military in repurposing *Starlink* for military purposes pose a new threat. Referring to Article 52(1) of the Protocol Additional to the Geneva Conventions of 12 August 1949, relating to the Protection of Victims of International Armed Conflicts (hereinafter referred to as AP I), it is explained that civilian objects are those that do not possess elements of military objectives as stated in Article 52(2) of AP I. The definition of military objectives according to Article 52(2) of AP I encompasses any object that, by its nature, location, purpose, or use, makes an effective contribution to military operations. Initially, under Article 52(2) of AP I, *Starlink* satellites were classified as civilian objects because they were intended for civilian use, commercial purposes, and did not have military objectives. However, once the Ukrainian military began using *Starlink* satellites to operate military drones, these satellites ceased to be considered civilian objects. I conclude that

⁵² Article VIII Outer Space Treaty.

⁵³ Steel City Drones, "Does My Drones Need Internet to Fly?", <https://www.youtube.com/watch?v=_vQQvIPEWbl>.

Starlink has met the criteria to be classified as military objectives. This is due to the crucial role that *Starlink* internet plays in enhancing attacks by drone operators, particularly in mapping the routes of Russian military convoys, thus contributing effectively to military operations. If the Ukrainian military had not utilized *Starlink* internet, they would not have succeeded in incapacitating Russian convoys through drones, especially since Ukrtelecom, the main communication service provider in Ukraine, experienced disruptions following the Russian invasion.⁵⁴

Consequently, a new threat may befall *SpaceX* due to the potential destruction of *Starlink* satellites, particularly by the Russian military. This is supported by various efforts undertaken by Russia to limit *Starlink's* ability to assist Ukrainian military operations, such as cyberattacks or even destruction. In May 2022, *SpaceX* reported that there had been attempts by Russia to hack the *Starlink* system in Ukraine.⁵⁵ If Russia were to destroy a *Starlink* satellite, I argue that the party responsible for that destruction would not be Russia, but rather Ukraine. This relates to the principle of Liability Based on Fault because the damage is a direct result of the Ukrainian military's actions, which transformed *Starlink* satellites into military objectives, thereby making them legitimate targets for Russia. *SpaceX*, through the United States, could file a compensation claim against Ukraine through diplomatic channels if their *Starlink* assets were successfully destroyed by Russia.⁵⁶

Carl Q. Christol, in his writing titled "International Liability for Damage Caused by Space Objects," argues that the following constitute direct damage:⁵⁷

a. Loss of time and income;

b. Destruction or seizure of property;

c. Loss of profits due to business disruption;

d. Loss of life;

e. Loss of rental rights;

f. Medical, physical, and mental disturbances.

Essentially, Christol's opinions are also reflected in Article I(a) of the Liability Convention regarding the definition of "Damage." Thus, *SpaceX*, through the United States, can file a claim against Ukraine for the direct damage incurred in the form of property destruction. In their claim, *SpaceX*, via the United States, needs to demonstrate that Ukraine's actions constituted negligence that led to damage to the *Starlink* satellites. To summarize, *SpaceX* and the United States can prepare arguments that: (1) Ukraine has used *Starlink* facilities for offensive purposes without permission from *SpaceX* or the United States, (2) Ukraine's actions have rendered *Starlink* satellites legitimate targets (Military Objectives), and (3) the destruction of *Starlink* satellites has resulted in losses for *SpaceX*. Referring to Article 36(2) of ARSIWA, the compensation that Ukraine must provide for the destruction of *Starlink* satellites should encompass losses that can be assessed financially. Thus, the compensation for *Starlink* should correspond to the number of objects that were damaged or destroyed. In 2019, *SpaceX* indicated that the cost of each *Starlink* satellite was around \$500,000, with a launch cost of about \$30,000,000. Meanwhile, an American investment firm, Morgan Stanley, assessed that the price of each *Starlink* satellite is approximately \$1,000,000, with a one-time launch cost of

⁵⁴ Chris Vallance, "Ukraine War: Major Internet Provider Suffers Cyber-Attack", <<https://www.bbc.com/news/60854881>>.

⁵⁵ Elizabeth Howell, "Elon Musk Says Russia is Ramping Up Cyberattacks on SpaceX's Starlink Systems in Ukraine",

<<https://www.space.com/Starlink-russian-cyberattacks-ramp-up-efforts-elon-musk>>.

⁵⁶ Article IX Liability Convention.

⁵⁷ Carl Q. Christol, "International Liability for Damage Caused by Space Objects", *The American Journal of International Law*, Vol. 74, No. 2, 1980, p. 360.

around \$50,000,000.⁵⁸ Therefore, I conclude that the amount that Ukraine would need to compensate *SpaceX* and the United States is quite substantial, reaching between \$30,500,000 and \$51,000,000.

Ukraine's Responsibility Toward Other Countries

In the previous section, it was explained that the use of the *Starlink* satellite by the Ukrainian military has caused *Starlink* to become a military objective, which means that the *Starlink* object is legitimate for attack or even destruction. Russia, as one of the parties in the armed conflict with Ukraine, essentially has the right to destroy the satellite on the grounds that the object has provided a military advantage to Ukraine and has harmed Russia.⁵⁹

On the other hand, a question arises regarding how a state is held responsible if the destruction carried out by Russia against *Starlink* results in debris that subsequently causes damage to other countries. Under international humanitarian law, as long as the attack is directed at a military objective, the attack is considered legitimate even if it causes additional damage (collateral damage). This is also based on the content of Article 48 of Additional Protocol I, which states that operations conducted by parties in conflict must be directed solely at military objectives.⁶⁰

Therefore, even if Russia conducts an attack on the *Starlink* satellite and such an attack generates space debris that subsequently causes damage to other states, Russia cannot automatically be held internationally liable, provided that the attack was conducted in accordance with the principles of international humanitarian law. Pursuant to Article 52(2) of Additional Protocol I to the Geneva Conventions, objects which by their nature, location,

purpose, or use make an effective contribution to military action and whose destruction offers a definite military advantage are considered legitimate military objectives. Additionally, Article 48 affirms that parties to a conflict must direct their operations solely against military objectives. If *Starlink*, by virtue of its usage by the Ukrainian military, is deemed to serve such a function, then an attack on it is lawful under the principle of distinction. Furthermore, the principle of proportionality and military necessity in customary international humanitarian law allows collateral damage, including environmental or third-party impacts, as long as it is not excessive in relation to the anticipated military advantage. Consequently, Russia would not bear international liability for indirect damage resulting from such a lawful attack, including harm caused by the resulting debris, unless it can be proven that the attack violated the principles of distinction, proportionality, or precaution. Therefore, legal responsibility in this context cannot be established solely on the basis of resulting harm but must consider the lawfulness of the initial targeting decision under IHL.

Consequently, the country that may be responsible in this case is Ukraine, based on the principle of liability based on fault. Affected states or those that feel harmed may file a claim against Ukraine through diplomatic channels. If a state does not have diplomatic relations with Ukraine, it may request another country that has diplomatic relations with Ukraine to submit its claims. However, if diplomatic negotiations between Ukraine and the harmed state do not reach an agreement, the parties may establish a claims commission.⁶¹

Based on the analysis of each part, the United States, as the launching state, is

⁵⁸ Brian Wang, "SpaceX Starlink Satellites Could Cost \$250.000 Each and Falcon 9 Costs Less than \$30 Million", <<https://www.nextbigfuture.com/2019/12/spacex-starlink-satellites-cost-well-below-500000-each-and-falcon-9-launches-less-than-30-million.html>>.

⁵⁹ Article 52 paragraph (2) Additional Protocol I.

⁶⁰ Article 48 Additional Protocol I.

⁶¹ Article XV Liability Convention.

not automatically responsible for the dual use of the *Starlink* satellite by the Ukrainian military because there was no consent from *SpaceX* through the United States to use *Starlink* for aggressive purposes. Furthermore, Ukraine, as the party utilizing the *Starlink* facilities, is also not responsible for the losses incurred by Russia during the attack on the convoy to Kyiv, citing self-defense. However, Ukraine can be held responsible if *Starlink*, as a military objective, is destroyed by Russia. Finally, Ukraine's responsibility toward other countries may arise if Russia does not destroy the *Starlink* satellite, and the debris from *Starlink* harms other states.

F. Conclusion

In summary, Ukraine's military use of *Starlink* internet for operating drones does not align with international law. Although intended for self-defense, this action lacked permission from *SpaceX*, and the mismatch between *Starlink*'s actual function and its registration data undermines Ukraine's compliance with the Registration Convention's goal of demilitarizing outer space.

Furthermore, the dual-use of *Starlink* by Ukraine raises issues of state responsibility for multiple parties, including the United States, Russia, and other affected nations. Ukraine, as the user of *Starlink* as a dual-use space object, cannot be held accountable to Russia due to its self-defense rationale. Similarly, the United States, as the launching state of *Starlink*, cannot be liable to Russia because there was no further approval from *SpaceX* or the U.S. for Ukraine to use *Starlink* for military purposes during its conflict with Russia. However, Ukraine may face liability to *SpaceX* through the United States if its facilities are destroyed by Russia based on military objectives. Lastly, Ukraine could also be held responsible if Russia successfully destroys *Starlink*, leading to damages to other countries from falling debris.

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