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## QUASI-MILITARY USE OF LARGE LEO SATELLITE CONSTELLATIONS: LEGAL CHALLENGES AND REGULATORY APPROACHES

The rapid deployment of large low-Earth orbit (LEO) satellite constellations has transformed commercial space infrastructure into a strategically significant component of contemporary security environments. Although these constellations are primarily designed for civilian communication, Internet access, remote sensing, and data transmission, their growing use in armed conflicts for communication support, target positioning, intelligence transmission, and other operational functions has blurred the traditional boundary between civilian and military space activities. This article examines the regulatory responses to such quasi-military use from a comparative-law perspective. It analyzes the legal and policy approaches of Japan, the United States, the European Union, and China, with particular attention to licensing, security review, market-access requirements, state supervision of private operators, and the principle of peaceful use of outer space. The study combines doctrinal legal analysis with comparative analysis of national and regional regulatory instruments. It finds that existing international space law remains the basic normative framework but does not fully address the dual-use character and cross-border effects of mega-constellations. The article argues that future governance should combine international soft-law mechanisms with clearer domestic hard-law rules, enhanced authorization and continuing supervision of commercial operators, and greater transparency in activities capable of supporting military operations.

**Keywords:** Comparative law, Large LEO constellations, Quasi-militarization, Militarization of outer space.

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### Ірі төмен Жер орбитасындағы (LEO) спутниктік шоқжұлдыздарды квазиәскери пайдалану: құқықтық сын-қатерлер және реттеу тәсілдері

Ірі төмен Жер орбитасындағы (LEO) спутниктік топтамалардың жедел орналастырылуы коммерциялық ғарыш инфрақұрылымын қазіргі қауіпсіздік ортасының стратегиялық маңызы бар құрамдас бөлігіне айналдырды. Мұндай топтамалар негізінен азаматтық байланыс, Интернетке қолжетімділік, Жерді қашықтан зондау және деректерді беру үшін әзірленгенімен, оларды қарулы қақтығыстарда байланыспен қамтамасыз ету, нысаналардың координаттарын айқындау, барлау ақпаратын жеткізу және өзге де жедел функцияларды орындау мақсатында пайдаланудың артуы азаматтық және әскери ғарыш қызметі арасындағы дәстүрлі шекараны көмескілендіруде. Мақалада осындай квазиәскери пайдалануды реттеудің құқықтық тәсілдері салыстырмалы құқық тұрғысынан қарастырылады. Жапонияның, Америка Құрама Штаттарының, Еуропалық одақтың және Қытайдың заңнамалық әрі саяси тәсілдері, әсіресе лицензиялау, қауіпсіздік талаптарын тексеру, нарыққа қол жеткізу шарттары, жеке операторларды мемлекеттік қадағалау және ғарыш кеңістігін бейбіт мақсатта пайдалану қағидаты талданады. Зерттеу ұлттық және өңірлік нормативтік актілерді доктриналық-құқықтық және салыстырмалы-құқықтық талдауды ұштастырады. Зерттеу қолданыстағы халықаралық ғарыш құқығы негізгі нормативтік негіз болып қала беретінін, алайда ірі спутниктік топтамалардың қосарлы мақсаттағы сипаты мен трансшекаралық салдарын толық қамтымайтынын көрсетеді. Авторлар болашақ реттеу халықаралық «жұмсақ құқық» тетіктерін неғұрлым айқын ұлттық «қатаң құқық» нормаларымен, коммерциялық операторларды рұқсат ету және тұрақты қадағалау рәсімдерін күшейтумен, сондай-ақ әскери операцияларды қамтамасыз етуі мүмкін қызметтің ашықтығын арттырумен ұштастыруы тиіс деп тұжырымдайды.

**Түйін сөздер:** салыстырмалы құқық, Ірі LEO шоқжұлдыздары, квазимилитаризация, ғарыш кеңістігін милитаризациялау.

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**Квазивоенное использование  
крупных низкоорбитальных спутниковых группировок:  
правовые проблемы и подходы к регулированию**

Быстрое развертывание крупных низкоорбитальных (НОО) спутниковых группировок превратило коммерческую космическую инфраструктуру в стратегически значимый элемент современной среды безопасности. Хотя такие группировки создаются прежде всего для гражданской связи, доступа к Интернету, дистанционного зондирования и передачи данных, их растущее использование в вооруженных конфликтах для обеспечения связи, определения координат целей, передачи разведывательной информации и выполнения иных оперативных функций размывает традиционную границу между гражданской и военной космической деятельностью. В статье рассматриваются правовые подходы к регулированию такого квазивоенного использования с позиций сравнительного права. Анализируются законодательные и политические подходы Японии, Соединенных Штатов, Европейского союза и Китая с особым вниманием к лицензированию, проверке требований безопасности, условиям доступа на рынок, государственному надзору за частными операторами и принципу мирного использования космического пространства. Исследование сочетает доктринально-правовой и сравнительно-правовой анализ национальных и региональных нормативных актов. Сделан вывод о том, что действующее международное космическое право сохраняет значение базовой нормативной основы, однако не в полной мере учитывает двойное назначение и трансграничные последствия крупных спутниковых группировок. Авторы обосновывают необходимость сочетания международных механизмов «мягкого» права с более четкими нормами внутреннего «жесткого» права, усилением разрешительных процедур и постоянного надзора за коммерческими операторами, а также повышением прозрачности деятельности, способной обеспечивать военные операции.

**Ключевые слова:** сравнительное право, крупные низкоорбитальные спутниковые группировки, квазимилитаризация, милитаризация космического пространства.

## Introduction

Currently, most commercially operated satellites worldwide are LEO satellites. Low Earth Orbit (LEO) refers to the orbit of artificial Earth satellites at an altitude of 200km to 2000km above the Earth's surface. Large low-Earth orbit (LEO) constellations are a type of transnational civilian infrastructure operated by non-governmental entities (private enterprises). They aim to provide low-latency, high-bandwidth internet communication and also encompass data transmission capabilities. The LEO constellation field is one of the core focal points of commercial satellite operations worldwide, with many countries racing to accelerate deployment. The United States is a clear pioneer in this field, with its company SpaceX possessing the world's only densely networked and commercially operational large LEO constellation – Starlink. According to future plans, the Starlink project will be divided into three phases, with a planned launch of 12,000 microsatellites to form a large satellite constellation, and reserved for a future network of 34,400 satellites. China's LEO constellation projects are also at the forefront globally, with three major LEO constellation projects: the Qianfan Constellation Proj-

ect, the Honghu Constellation Project, and the GW Constellation Project. Among them, the GW constellation has already launched over 150 satellites. Besides the United States and China, the EU's IRS2 large constellation and the UK's OneWeb have also entered the networking phase. It is foreseeable that large low-Earth orbit constellation projects will see a significant increase in the future.

At the same time, the expansion of these constellations has created a legal problem that is not fully captured by the traditional distinction between civilian and military space activities. Commercial LEO systems may remain privately owned and formally civilian while providing communications, positioning, data transmission, or intelligence support that directly contributes to military operations. This dual-use character complicates the application of the peaceful-use principle and raises questions concerning state responsibility, authorization and continuing supervision of private operators, and the legal limits of commercial participation in armed conflict (United Nations, 1967; von der Dunk, 2020).

Against this background, the article examines how different legal systems respond to the quasi-military use of large LEO constellations. It focuses on Japan, the United States, the European Union,

and China in order to identify both common regulatory trends and important differences in licensing, security review, market access, state supervision, and the treatment of dual-use commercial services. The study therefore seeks to clarify whether existing international and domestic legal mechanisms are sufficient for emerging forms of quasi-military use and what combination of international soft law and domestic hard law may provide a more coherent regulatory response.

### Methods

This study employs a combined doctrinal and comparative legal methodology. The doctrinal component is used to identify the legal principles applicable to the quasi-military use of large LEO constellations, including the peaceful-use principle, state responsibility for national space activities, authorization and continuing supervision of non-governmental entities, and the regulation of dual-use commercial space services. Primary legal materials include international space-law instruments, national legislation, executive and policy documents, and regional regulatory proposals. Secondary sources are used to clarify competing interpretations of these rules and to place recent regulatory developments within the broader debate on commercialization, dual-use technologies, and space security.

The comparative component examines Japan, the United States, the European Union, and China as distinct regulatory models. These jurisdictions were selected because they combine significant space capabilities with different approaches to the relationship between commercial operators and national security. The analysis compares four dimensions: (1) licensing and authorization of commercial space activities; (2) security review and restrictions on the provision or transfer of satellite data and services; (3) mechanisms for continuing state supervision and operator accountability; and (4) the use of market-access, policy, or strategic instruments to manage dual-use risks. Rather than treating each jurisdiction as directly equivalent, the comparison identifies functional similarities and differences in how legal systems respond to the same regulatory problem.

The research also uses a problem-oriented case analysis of the quasi-military functions performed by commercial LEO systems in contemporary armed conflict, particularly satellite communications, positioning, data transmission, and intelligence support. This allows the formal legal rules to be assessed against the operational reality of dual-use constel-

lations. The study does not attempt a technical assessment of satellite architecture or military effectiveness; its scope is limited to legal regulation and governance. On this basis, the article evaluates whether existing international rules and domestic regulatory mechanisms are sufficient and identifies possible pathways for combining international soft law with domestic hard law.

### Literature review

Large low-Earth orbit constellations can not only provide civilian satellite communication and Internet services to global users, but also provide special military services to the armed forces of various countries. This characteristic of being both civilian and military makes the boundary between military and civilian use significantly blurred. Quasi-military use refers to the objective phenomenon that commercial constellations do not directly carry or deploy space weapons, but are used in armed conflicts to provide key military support services such as satellite communication, target positioning, and intelligence reconnaissance. This falls under the category of indirect militarization, that is, using artificial satellites to provide support for general warfare and improve the combat effectiveness of ground forces.(Chenjie D., 2023) In the ongoing Russia-Ukraine conflict since 2022, low-Earth orbit commercial constellations, originally commercial infrastructure, have been deployed on a large scale in the battlefield for the first time. SpaceX has provided a lot of support to Ukraine with its large low-Earth orbit constellations. Starlink has provided significant assistance to Ukraine, undertaking key military functions such as satellite communication, combat target positioning, and information transmission. In military conflicts, it is used for communication between armies, between command organizations and frontline troops, and to support the defending side in real-time transmission of battlefield situation intelligence and the call for precision fire strikes. Beyond the Russia-Ukraine conflict, Starlink has many more quasi-military applications. SpaceX has signed multiple contracts with the US military to explore the military applications of the Starlink constellation. In 2019, the US Air Force completed the low-Earth orbit technology verification of Starlink, testing the direct connection capability between Air Force fighter jets and large low-Earth orbit satellites. Currently, SpaceX has even publicly announced a special service – Starshield – specifically designed for governments and military forces

worldwide. Its satellites are specially software-designed to better meet the needs of military mobile systems. (Jihui W., Jingjing X., 2022) In response, the Russian military has also deployed the Peresvet laser weapon system, which can disable satellites in a specific area of low Earth orbit, and can be used as an anti-satellite weapon in actual combat. Once such a large commercial satellite constellation is applied to the battlefield, it transforms from a simple logistical support tool into a decisive means of combat. (III) Legal Risks and Regulatory Dilemmas Arising from Quasi-militarized Use Faced with the new normal of quasi-militarized use of large low-Earth orbit (LEO) constellations, the existing outer space legal system has revealed serious lag and limitations. Failure to restrict quasi-militarized use could easily trigger a disguised arms race in outer space. First, it undermines the principle of peaceful use of outer space. The Outer Space Treaty establishes a core principle – the principle of peaceful use of outer space. Although large LEO constellations are currently mainly communication satellites and do not carry any lethal weapons capable of directly attacking the ground, formally circumventing the literal meaning of Article 4 of the Outer Space Treaty and not constituting the deployment of weapons in outer space, this “quasi-militarized” use model, which deeply supports military operations without directly deploying weapons, poses an unprecedented and severe challenge to the lasting peace of outer space and global space security. Because the interpretation of “peaceful use” in the treaty is ambiguous, there is international controversy. Some Western countries insist on a “non-aggressive” interpretation, believing that “peaceful purposes” only prohibit aggressive activities and the direct deployment of weapons from outer space, while all other military uses outside the listed scope are permitted. This aligns with the actual practices of the United States, especially since the Trump administration. Another perspective calls for a stricter definition of “peaceful,” arguing that the use of outer space for “peaceful purposes” excludes its use for any military purposes. Current international law does not completely prohibit the militarization of outer space, and the systems in place to prevent the quasi-militarization, weaponization, and arms race in outer space are inadequate and uncertain.

Recent legal scholarship confirms that the central regulatory difficulty lies not in the absence of any applicable law, but in the interaction between established space-law rules and the dual-use functions of privately operated systems. Article VI of the

Outer Space Treaty remains particularly important because it requires states to authorize and continuously supervise the space activities of non-governmental entities; this obligation is widely regarded as a principal legal basis for national regulation of commercial operators (von der Dunk, 2020; de Zwart, 2025). At the same time, the use of commercial satellites in armed conflict raises additional questions under international humanitarian law, including when a dual-use space object may acquire military relevance and how civilian operators should be treated (Berrang, 2025). The UN Guidelines for the Long-term Sustainability of Outer Space Activities further demonstrate the growing role of non-binding standards in improving supervision, information exchange, safety, and responsible conduct in an increasingly congested orbital environment (United Nations COPUOS, 2019). These studies support the need to analyze quasi-military use through both international obligations and domestic regulatory mechanisms.

## Results

### *Japan's Regulatory Approach*

Regarding Earth remote sensing satellites in low Earth orbit, Japan enacted the Satellite Remote Sensing Data Processing Law in 2016. According to Article 2 of this law, “artificial satellites” are defined as instruments installed on satellites that receive electromagnetic waves transmitted from Earth into space and have the function of transmitting data back to the ground. Based on this definition, each microsatellite constellation that makes up a large low-Earth orbit constellation falls within the scope of this law. The law stipulates that, in order to prevent high-resolution satellite imagery from being used by terrorist organizations or hostile states for paramilitary purposes such as military strikes and target location, the Japanese government has the right to impose security restrictions on the provision of data by commercial satellites. Regarding situations where constellations are used for illegal paramilitary purposes, the law stipulates that if the provision of commercial satellite data is deemed “potentially detrimental to the peace and security of the international community,” the Japanese government can legally prohibit the sale and transmission of that data. The Space Activities Law establishes strict oversight of commercial companies operating large low-Earth orbit (LEO) constellations. This law establishes a security review and licensing system, requiring that LEO satellite constellations launched

within Japan or subject to jurisdiction due to their provision of services within Japan must obtain a license issued by the Prime Minister. During the license review, Japan will examine whether the satellite constellation complies with its peaceful use obligations. If a large LEO constellation conflicts with Japan's obligations under international treaties, including the five major treaties on outer space, the government will not issue or will revoke its administrative license.

Furthermore, Japanese domestic legislation is not only focused on preventing paramilitation. Japan and the Japan Self-Defense Forces are also preparing in this direction for the potential future trend of large LEO constellations and the paramilitation of outer space. In December 2022, Japan released the "Three Security Documents," which included the "National Security Strategy" (National Security Strategy). To implement this strategy, the Fumio Kishida Cabinet released the "Space Security Concept" (Space Security Concept) in July 2023 (Cabinet House, 2016). This document aims to form a framework for the construction of Japan's space security system over the next 10 years. (China National Defense News, 2023) The document proposes to promote the development of the satellite industry and increase technical and financial support for major commercial satellite companies, thereby expanding support for commercial aerospace technologies with high dual-use characteristics. It also proposes to build a "satellite constellation" surveillance network composed of small satellites. The Japan Air Self-Defense Force also plans to change its name to the Air and Space Self-Defense Force, which is the first time since 1954 that a service-level name change has been made. These measures show that Japan has both defined legal boundaries for the illegal paramilitary behavior of large low-orbit constellations that may occur from multiple perspectives in terms of domestic legislation, in order to maintain the legitimacy of regulation, and at the same time left a backdoor to deal with new trends in the future.

### ***The Remilitarization of Space Clause in the United States***

In addition, there is the indirect violation of the "peaceful use of outer space" clause – the remilitarization of space. Since President Trump first took office, the United States has announced the restart of its space security strategy. In 2017, then-President Trump signed an executive order reactivating the National Space Council. Subsequently, in August 2019, Trump announced the establishment of

the U.S. Space Force Command. In December 2020, the enactment of the National Defense Authorization Act for Fiscal Year 2020 marked the formal establishment of the U.S. Space Force. According to the U.S. Space Defense Strategy Summary, the U.S. goal is to comprehensively advance the militarization of space, establish comprehensive military superiority in space, and ensure U.S. leadership in the space environment. In the past two years, the U.S. Department of Defense, in the National Defense Authorization Act Summary for Fiscal Year 2024, has specified that space is included in the "strategic operational domain," granting the Space Force initial authority as a single branch of service, integrating policy elements of active and reserve personnel from other armed forces. In the chapter on "Space Defense Activities," the Act emphasizes three major deployments. (The White House, 2018) First, it details the regulations for the Space Force to sign agreements with commercial entities and receive cost reimbursement; second, it allows the Space Force to integrate with U.S. allies and operate side-by-side; third, it allows for the rapid deployment of multiple batches of satellites and related systems owned by the Space Development Agency system by mid-level personnel. Furthermore, the bill allows for direct conversion between active and reserve positions for the Space Force without requiring a change of service members. In December 2025, U.S. President Trump again signed an executive order entitled "Ensuring America's Space Priority Hegemony." The first clause of the order states that primary rights in space are the yardstick for national vision and coercion. To ensure the development of U.S. national power, security, and prosperity, the United States must pursue this space policy to... safeguard national security interests. Article 2, paragraph 2, stipulates that the United States will defend and protect its core security interests in space by the following means: (i) continuing to develop and demonstrate prototypes of next-generation missile defense technologies by 2028, in accordance with U.S. Executive Order No. 14186 of January 27, 2025 (U.S. Iron Dome defense system), substantially enhancing the United States' ability to defend against air and missile attacks in space; paragraph 4 stipulates that the near-term use of space nuclear energy is permitted by deploying nuclear reactors on the Moon and in low Earth orbit, including a lunar surface reactor scheduled for launch before 2030. A series of actions by the Trump administration have opened the door to remilitarization. From large constellations in low Earth orbit to the Space Force, the United States

has expressed its resistance to the peaceful use of space by using a heavy hand to show its light hand. (Guoyu W., 2016) The 2025 United Nations Geneva Conference on Outer Space Security, co-organized by the United Nations Office for Outer Space Affairs (UNOOSA) and other governments including the European Union, China, Russia, the United Kingdom, the United States and Singapore, clearly warned that Earth orbit is facing a regulatory crisis and that an international legal mechanism adapted to the development of large satellite constellations is urgently needed. Therefore, with the development of technology, large constellations pose an increasing challenge to existing outer space laws, calling for the arrival of new-scale legal regulations.

#### ***Multi-layered regulation of the EU Space Act Draft***

In June 2025, the European Commission officially published the draft of the EU Space Act. The Act is built around the three pillars of security, resilience and sustainability. Many of its core provisions are actually tailored to address the frequency congestion, security threats and paramilitary use brought about by large low-Earth orbit constellations in the United States, represented by Starlink. According to the draft Act, all entities subject to jurisdiction must be required to register in the newly established Union Register of Space Objects (URSO) and obtain an electronic certificate that meets the compliance requirements. (European Commission, 2025) This means that large foreign constellations that do not accept the EU's environmental and safety review will be completely expelled from the European market. In terms of the extraterritorial effect of the Act, it follows the same path as the US FCC. The Act also first establishes "long-arm jurisdiction" based on market access. The Act stipulates that even non-EU constellation operators must obtain authorization from the EU and designate a legal representative in Europe if they provide space services or space data within the EU. This means that large low-Earth orbit constellations must comply with EU regulations if they wish to provide services or even use data within the EU. Through this relatively ingenious approach, countries have successfully incorporated domestic legislation into outer space governance.

#### ***New Practices of Quasi-Military Legal Regulation in China***

Domestically, China has also constructed a multi-tiered regulatory system combining soft and hard laws. In December 2025, the Ministry of For-

eign Affairs of the People's Republic of China released the white paper "China's Arms Control in the New Era," which declared that China firmly opposes offensive outer space military policies, opposes outer space military alliances, opposes the weaponization, battlefieldization, and arms race of outer space, and opposes the use of commercial spaceflight to intervene in other countries' armed conflicts or interfere in their internal affairs. This constitutes China's basic stance on the use of outer space, namely, a peaceful use stance. In other words, the Chinese government's position is to consistently adhere to the peaceful use of outer space, safeguard outer space security, and oppose the further proliferation of quasi-militarized behavior in outer space.

Furthermore, China has released its Action Plan for Space Safety Development in the form of departmental normative documents, namely the "Action Plan of the National Space Administration for Promoting High-Quality and Safe Development of Commercial Space (2025-2027)." The document points out that it is necessary to improve the legal and policy system for commercial aerospace. Accelerate the legislation of the National Aerospace Law, clarify the status and role of commercial aerospace in the development of national aerospace, and ensure the healthy and sustainable development of commercial aerospace. In May 2021, the State Administration of Science, Technology and Industry for National Defense and the Equipment Development Department of the Central Military Commission jointly issued the "Notice on Promoting the Orderly Development of Microsatellites and Strengthening Safety Management" (State Administration of Science, Technology and Industry for National Defense, 2021). The notice states that before performing launch missions, civilian and commercial microsatellites should apply for a civilian aerospace launch project license in accordance with the relevant requirements of the "Interim Measures for the Management of Civil Aerospace Launch Project Licenses" and the "Notice on Promoting the Standardized and Orderly Development of Commercial Launch Vehicles"; satellites not approved by the state should also apply for a special review to the Equipment Development Department of the Central Military Commission in accordance with relevant requirements. These reflect China's attempt to implement multi-level regulation, using departmental regulations or normative documents, with advance approval as a key measure, to control the possibility of militarization of large low-orbit constellations.

This reflects China's firm opposition to the quasi-militarization of large low-orbit constellations.

### Discussion

The lasting peace and security of outer space are crucial to the security, development, and prosperity of all nations, and are in line with the well-being and long-term interests of all humankind. Faced with outer space hegemony, it is necessary to establish a rule-of-law-based outer space order internationally to limit the boundaries of peaceful use of outer space by powerful outer space powers due to their technological advantages. Correspondingly, the role of domestic laws in advocating the peaceful use of outer space should also be brought into play. To this end, it is necessary to approach this from both international and domestic perspectives, using a combination of soft and hard law, focusing on the fundamental principle of peaceful use of outer space, and restricting quasi-militarized use and acts of war or infringement caused by improper use.

From a legal-governance perspective, Article VI of the Outer Space Treaty is especially relevant to large commercial constellations because state responsibility is not displaced by private ownership. The requirement of authorization and continuing supervision means that domestic licensing should not be treated as a one-time administrative act; rather, states need mechanisms capable of monitoring changes in mission profile, service recipients, data use, and security-sensitive functions over the operational life of a constellation (von der Dunk, 2020; de Zwart, 2025). This is particularly important for systems that can shift rapidly from ordinary civilian service to operational support for armed forces without any physical modification of the spacecraft.

#### *Promoting Peaceful Use under the Rule of Law through Soft Law*

To ensure that outer space activities are conducted peacefully, equally, and freely, all nations should rely on and fully and strictly abide by established and explicit international law and outer space law rules, such as the UN Charter, the five outer space treaties, and other international outer space treaties, in order to jointly construct a stable and sustainable environment for outer space development. Under current conditions, it is clearly unrealistic to re-examine the applicability of cornerstone treaties preventing the weaponization of outer space, such as the Outer Space Treaty, the Lunar Agreement, and the Responsibility Convention. Since existing hard

law norms cannot be upgraded, it is clearly more feasible to adopt a UN General Assembly resolution to prevent further militarization of outer space and to facilitate dispute resolution.

Existing soft-law instruments also provide a practical foundation for incremental regulation. The 2019 UN Guidelines for the Long-term Sustainability of Outer Space Activities do not directly prohibit quasi-military use, but they promote national regulatory frameworks, supervision of space activities, information sharing, risk mitigation, and responsible conduct. Their significance lies in offering a politically feasible platform on which more specific transparency and due-diligence standards for mega-constellations can be developed without reopening the foundational space treaties (United Nations COPUOS, 2019).

In this context, China should actively play a leading role as a major power, advocating the concept of a "community of shared future for mankind in outer space" and a "holistic national security concept" to the international community. This concept requires that the "common interests of all mankind" in treaties be concretized into national obligations, explicitly opposing the abuse of the right to free exploration by individual countries for hegemonic expansion. Currently, a large number of low-Earth orbit (LEO) constellations are operated by private entities and are substantially involved in geopolitical conflicts; therefore, states must bear primary responsibility for preventing the quasi-militarization of outer space. China advocates establishing a rules-based outer space order to effectively constrain the quasi-militarization of LEO constellations and ensure that they serve the peace and development of all mankind.(Weiyu Z., 2023)

#### *Domestic Law Delineates the Red Line for the Militarization of Large Low-Earth Orbit Constellations*

All countries should establish full-cycle national regulatory obligations and legal red lines. Domestic laws must clearly define the boundaries of commercial space entities' participation in militarization activities to prevent corporate violations from leading to state liability. Simultaneously, a "back-door clause" for application exemptions should be established: when other countries' constellations are widely used for combat purposes, the state has the right to explicitly authorize defensive military applications to avoid self-inflicted harm. Furthermore, an emergency response paradigm based on "national coordination" needs to be constructed. Given the in-

creasing militarization and complexity of low-Earth orbit constellations, China should advocate for the international community to adopt a similar principle of “final state oversight,” opposing commercial space giants using “trade secrets” as a pretext to evade national regulation and international security obligations, thereby legally curbing the erosion of public security by private enterprises.

China should accelerate the legislation of the “Space Law of the People’s Republic of China,” legalizing international obligations for the peaceful use of outer space within the domestic legal framework. In legislative action, China should first establish rigid constraints domestically, setting an example for the international community. According to Article 6 of the Outer Space Treaty, each contracting party bears international responsibility for the outer space activities of its non-governmental entities. To avoid the state bearing joint liability for compensation due to corporate violations, and to ensure that Chinese constellations can provide legal evidence of “due diligence and exemption from liability” when criticized, the full-cycle management system outlined in the “Notice” must be legalized. Issues related to the peaceful use of large low-Earth orbit (LEO) constellations involve multiple facets of international law, including not only international outer space law but also international humanitarian law and other war-related laws. Relying solely on the current regulations issued by the State Space Administration at the bureau-level and some plans issued by the State Council is insufficient. It is essential to establish legal-level rules and regulations, systematically build a launch and operation system for large LEO constellations, and establish relevant liability principles and compensation methods.

## Conclusion

The comparative analysis demonstrates that the quasi-military use of large LEO constellations is being addressed through increasingly diverse regulatory instruments rather than through a single comprehensive international regime. Japan emphasizes licensing, security review, and restrictions on sensitive remote-sensing data; the United States increasingly integrates commercial space capabilities into its national-security architecture; the European Union is moving toward market-access, resilience,

sustainability, and operator-compliance requirements; and China is developing a layered framework based on policy guidance, licensing, safety management, and prospective national space legislation. Despite these differences, all four approaches confirm that the regulatory importance of commercial operators has grown substantially as civilian constellations acquire functions relevant to military operations.

At the international level, the Outer Space Treaty continues to provide the essential legal baseline, particularly through the principles of peaceful use, state responsibility, and the authorization and continuing supervision of non-governmental entities. However, these general obligations do not by themselves resolve the legal uncertainty created by dual-use services, rapid changes in operational purpose, cross-border provision of satellite services, and the growing dependence of armed forces on private infrastructure. For this reason, the most realistic regulatory pathway is not the immediate replacement of the existing treaty framework, but its gradual specification through international soft-law standards and more detailed domestic hard-law mechanisms. Such regulation should include transparent licensing criteria, continuing supervision throughout the operational life of a constellation, security-sensitive data and service controls, reporting duties, and procedures for assessing changes from civilian to military-support functions.

For China, this approach implies strengthening domestic space legislation while also participating more actively in the formation of international standards. Domestic rules should clearly define the responsibilities of commercial operators and provide a legally stable basis for authorization, supervision, liability, and emergency measures. Internationally, China can promote transparency, prior notification of significant orbital operations, information exchange, and other confidence-building practices as potential soft-law standards. Combining these two levels would allow the peaceful-use principle to be supported not only by political declarations but also by operational regulatory mechanisms. More broadly, effective governance of large LEO constellations requires a balance between commercial innovation, legitimate national-security interests, and the preservation of outer space as a stable and sustainable environment for all states.

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