Starlink Program in the Russian-Ukrainian War

Programa Starlink en la guerra ruso-ucraniana

Programa Starlink na Guerra Russo-Ucraniana

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ABSTRACT

The strategic use of SpaceX's Starlink satellite constellation in the Ukrainian War provided comparative gains to Ukrainian troops that hampered Russian troops' actions and drew China's attention, who stated that the system is a potential threat to their national sovereignty. Thus, the objective of this text is to analyze the impacts of the Starlink Program in the conflicts of the Russo-Ukrainian War of 2022.

Keywords: Military Aerospace Power; Outer Space; Russo-Ukrainian War; Starlink.

RESUMEN

El uso estratégico de la constelación de satélites Starlink de SpaceX en la Guerra de Ucrania proporcionó ganancias comparativas a las tropas ucranianas que obstaculizaron las acciones de las tropas rusas y llamaron la atención de China, quien afirmó que el sistema es una potencial amenaza para su soberanía nacional. Así, el objetivo de este texto es analizar los impactos del Programa Starlink en los conflictos de la Guerra Ruso-ucraniana de 2022.

Palabras-claves: *Espacio exterior; Guerra Ruso-ucraniana; Poder aeroespacial militar; Starlink.*

RESUMO

O uso estratégico da constelação de satélites Starlink da SpaceX na Guerra da Ucrânia proporcionou ganhos comparativos às tropas ucranianas em detrimento das russas e chamou a atenção dos chineses, a ponto de se pronunciarem sobre o assunto como uma potencial ameaça à soberania nacional. Diante desse cenário, o objetivo do texto é analisar os impactos do Programa Starlink no cenário de conflito da Guerra Russo-Ucraniana de 2022.

Palavras-chave: *Espaço exterior; Guerra Russo-Ucraniana; Poder Aeroespacial Militar; Starlink.*

1 INTRODUCTION

The performance of non-state actors is a constant variable in conflicts and wars. In the 21st century, it is not different. On one hand, the specialized literature in Strategic and Defense Studies strives to understand how they interfere in belligerent processes; on the other, the Russian-Ukrainian War of 2022 presents numerous episodes of participation of these agents in a field that, until very recently, was a monopoly of the state: the outer space.

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The acronyms and abbreviations contained in this article correspond to the ones used in the original article in Portuguese.

In the scope of Aerospace Power, the case of Space Explorations Technologies Corporation, better known as SpaceX, draws attention. Founded in 2002 and headquartered in the United States of America (USA), it develops aerospace systems, manufactures means of space transportation and provides satellite telecommunications, and is also a private company with public funding and financed by venture capital (PITCHBOOK, 2022). But, after all, what interests would SpaceX have in acting in the current East-European conflict and, more specifically, what are the impacts of its Starlink Program on the current East-European conflict? These are some of the questions that this brief essay intends to approach, with the warning that the episodes narrated and analyzed here are still developing at the time of the writing of this text.

2 NEW STRATEGIC DOMAIN AND NEW ACTORS

In the same way that the participation of a private space company is something rare to see in today's armed conflicts, SpaceX's entry into the Eastern European theater of operations (TO) is also unprecedented. SpaceX's most direct participation in the 2022 Russian-Ukrainian War begins on February 26, 2022, with the response to a tweet by Mykhailo Fedorov, Ukraine's Deputy Prime Minister and Minister of Digital Transformation, in which he called on billionaire Elon Musk, founder and head of SpaceX, to provide Starlink stations for Ukraine (FEDOROV, 2022a).

Starlink is a SpaceX program that distributes broadband internet to the entire world through a constellation of satellites located in Low Earth Orbit (LEO). Musk promptly answered the call, and from the first delivery – on February 28, 2022 – to early June 2022, more than 15,000 Starlink kits have reportedly been delivered to Ukraine (DUFFY, 2022; FEDOROV, 2022b; RICQUE, 2022a).

The advantages provided by the strategic use of Starlink have greatly impacted both the military and civilian spheres, with developments in the political, economic, and social dimensions (RICQUE, 2022b). The military gains granted to Ukraine are more related to the maintenance and improvement of command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) capabilities. This stems from the support that the satellites give to military operations today, as true force multipliers, or even as force enhancements. To cite a few examples, the integration between satellites and military operations enables: global communications; information for meteorological services, intelligence, surveillance, and reconnaissance services; data for positioning, navigation, and timing; and early warning systems (DOLMAN, 2018; HARDING, 2013; HAYS, 2009). As seen today in this TO, such spatial supremacy, linked to cyber, psychological, and electronic warfare actions, are essential to victory – or, in this case, not to lose – a conflict in the Age of Information.

Despite reverberating across the spectrum of C4ISR, the main benefits that Ukrainian military forces have obtained from Starlink are reliable and resilient means of communication to coordinate their military operations, such as counterattacks and artillery support requests (ATLAMAZOGLOU, 2022). As we observed in 2014, with the rapid episodes that led to the annexation of Crimea, this was a tactic widely employed – and indeed denied to the enemy – by the Kremlin. In addition, SpaceX's telecommunication support makes it possible, among other things, to operationalize drones of non-state actors for military purposes, as does the Aerorozvidka, a non-governmental organization (NGO) linked to the Ukrainian army that has civilian and former military members operating this type of aerospace asset. Incidentally, this same NGO has as its main mission to help the security and defense forces of Kyiv to defeat the Russians, having as its main means of action, the operation of drones (AERORozvidka, 2022; Parker, 2022).

In addition, the Starlink system receivers are the only non-Russian means of communication used by Ukrainians, which makes it difficult for them to intercept, control, and interfere, thus disadvantaging Putin's troops (LAUSSON, 2022; MUSK, 2022). From the point of view of the evolution of the contemporary military strategic thinking, this point is crucial to draw some lessons from the ongoing war: the denial of informational access by the enemy, through the use of assets – software and hardware – coming from a third party – in this case, SpaceX – hidden in the initial variables when thinking about the invasion of enemy territory, adding to the fog of war.

Thus, due to the support it was providing to Ukrainian troops, the increase in its capabilities and the impacts on military operations, the Starlink system began to be targeted by the Russians, thus becoming a potential target not only for public statements (political level), but also military (tactical and operational levels), since it was quickly incorporated into military doctrine (strategic level).

Over time, attempts to interfere and hack Starlink have increased, according to SpaceX's own founder (PEARSON, 2022). Because of the military gains he provided to the Ukrainians, Elon Musk was reportedly threatened by the Head of the Russian Space Agency, Dmitri Rogozine, for strengthening the enemy's military communications (WALL, 2022). Now, in a context of informational warfare – especially cyber warfare – this aerospace interference has proven to be an effective countermeasure.

Although Russia is the main party affected by the performance the Starlink system has delivered to Ukraine, other state actors have started to pay more attention to this type of foreign participation in the TO, even if it comes from a private company. In this wake, India has spoken out as to the dangers and limitations that Musk's satellites were posing and imposing on Indian space operations (LAXMAN, 2022). But it was precisely China, which currently supports Moscow, that led a true "militarized" analysis of this aerospace program, made public in April 2022. Since the previous year, the Chinese had already accused the head of SpaceX of being conducting a "space war", after one of Starlink's satellites passed remarkably close to the Chinese Space Station (MISTREANU, 2021). At the time, the Chinese government emphasized the great potential for military purposes of these satellites, in which the threat perceived by the Chinese only increased after the U.S. government considered the Starlink satellites as a very viable alternative to the Global Positioning System (GPS) – which, is already lagging behind competing systems such as the European Galileo and the Chinese BeiDou (CORFIELD, 2021)– especially in light of the effects of SpaceX's satellite support to Ukraine.

In April 2022, Chen (2022) reported that five Chinese researchers published, in Mandarin, the paper "The Development Status of Starlink and Its Countermeasures", with its English translation made available by Cowhig (2022). In it, the authors problematize Starlink's low-orbiting constellation, which could bring "hidden dangers and challenges" to China's sovereignty and national security (REN et al., 2022). Through this study, Ren et al. (2022) analyze the application of Starlink's capabilities and suggest countermeasures to them.

From these analyses, the authors indicate that the main features of Starlink would be as follows: (1) integrated, uninterrupted global coverage from the Equator to the Poles; (2) high-speed network, with more than 50 Mb/s per user and projection of 1 Gb/s; (3) low latency, between 20 and 40ms; (4) high capacity of data support of each satellite, individually, ranging from 17 to 23 Gb/s, already having satellites with capacities for 32 Tb/s; (5) low cost, due to the reuse of launch rockets and the propulsion used by the satellites in space, as well as the standardization and commercialization of large-scale components, which favors the maintenance and replacement of parts of the system; (6) high tolerance to errors, since the failure of a small group of satellites in the system does not affect, in general, its performance, thus conferring flexibility, performance and robustness to the system as a whole; and (7) solid orbital maneuverability, with the ability to reposition itself in orbit at any time (COWHIG, 2022). Faced with such versatility, it is no wonder that such resources are of interest to the U.S. military, and there are already research and development (R&D) orders conducted in this regard (COWHIG, 2022).

In addition, it would also be possible to provide, at a low cost, stable and reliable broadband communication capabilities, capable of transmitting high-definition images and videos to any combat unit around the world. According to Ren et al. (2022), the U.S. Army would already be able to integrate means of combat, during simulated exercises, using Starlink, obtaining an increase in C4ISR capabilities, through the provided chain of command and control (C2). To us, this seems to be yet another trend in prospective studies of the Wars of the Future, i.e., the almost immediate incorporation of aerospace assets coming from the private sector; a logic that, for example, in the First Space Race was unimaginable.

In addition, there would be an increase in surveillance and reconnaissance applications not only of stationary but also moving targets, in all weather conditions, due to the unrestricted global coverage of Starlink's satellites. All this with a high revisit rate anywhere on the globe. But the significant gains in employment – and, from now on, in the preparation of Aerospace Power – are not restricted to this: there is also the favoring of the detection and suppression capabilities of targets that are in orbit, such as missiles, satellites and hypersonic vehicles. Finally, there is the opportunity to assess future combat platforms in space, supporting other satellite assets, carrying sensors and communication equipment, and thereby increasing the flexibility and anti-destruction attributes.

With this potential, superpowers like the US could increase their conditions to degrade the quality and speed of decision of their adversaries, thus reducing their initiatives and gains in the TO. It is at this point that Ren et al. (2022), for example, state that the peculiarities of Starlink, with its integrated application, pose as potential threat that should be considered to safeguard national interests and thus protect Chinese space assets.

To counter such systems, it would be necessary for China to take three lines of action. Still according to Ren et al. (2022), first, it is necessary to strengthen R&D in space combat system requirements, from the observation of the Starlink program and other similar constellations of internet providers, focusing on their capabilities and employment possibilities, in order to respond and counter them. Second, to strengthen the reserve of satellite orbital frequencies for China, due to the growing number of users, which has restricted the availability of bands of the electromagnetic spectrum considered as strategic to ensure military telecommunication. Finally, actively develop not only existing countermeasures, but also new ones, based on the peculiarities and reach of already established and developing threats (COWHIG, 2022). What is seen, therefore, is the continuous relevance of R&D activities,

conducted, geographically and geopolitically, far from the TO, but with decisive consequences for the conditions in which the confrontations will take place.

In the midst of all of that, there is also the debate about whether Starlink's satellites could legitimately be considered military targets. We bring in Brown (2022b) to illuminate our perception: "the Starlink constellation is a valid military objective," because of its potential of supporting military activities as well as the resulting advantages it provides. In this case, SpaceX satellites used in military support would fall under Article 52, item 2, of the Additional Protocol I to the 1949 Geneva Conventions. It states that, attacks are restricted to military objectives that offer "a definite military advantage" (International Committee of the Red Cross, 2022).

Another discussion that we observe in the incipient literature on the subject here versed is regarding the risk that non-state actors, such as SpaceX, end up leading states into an armed confrontation – something that, not so long ago, was a constant about the so-called cyber war. According to Brown (2022a), this "would depend on the connection between the support and specific conducts of hostile operations, and whether the actions of the non-governmental actor are under general state control." In the case of Starlink, the author does not consider that the "militarization" of this program represents the United States as belligerent, despite "observing the activities of commercial actors in space and understanding that such commercial actors can become legitimate military objectives" (BROWN, 2022a). Therefore, the introduction of aerospace assets, such as Starlink, into an interstate conflict between state A and state B, although coming from the private sector, could escalate the conflict or even introduce, albeit indirectly, a state C – and its extracontinental partners – into the conflict. As it turns out, with great capacities also come great responsibilities.

3 CONCLUSIONS

Starlink has equipped Ukraine with stable, reliable broadband communication capabilities, and boosted the performance of its C4ISR through a more robust chain of command and control (C2). In addition, it contributed to increasing the quality and speed of decision making of Ukrainians, reducing Russian initiatives and their gains in TO.

As we were briefly able to observe, therefore, the Starlink program is taking space capabilities for military use to a new frontier. One can consider its use in the Russian-Ukrainian War of 2022 as a kind of baptism of war, because it will certainly contribute to Aerospace Power, in the sense of integrating its constituent elements, comprehensively and almost anywhere in the world, at an exceptionally low cost and with high effectiveness in its intent.

Therefore, the role not only of companies, but also of individuals linked to seemingly distant areas of the TO must be another variable to be considered by the new strategists to make the fog of war the less blurry as possible.

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