THE DOSSIER

Russia's Space War for Ukraine is Just Getting Started

By Brandon J. Weichert

Executive Summary

Over the last decade, the Russian military has reorganized itself to fight a war in space. Everything from traditional anti-satellite (ASAT) weapons to co-orbital attack satellites to lasers designed to blind sensitive American satellites has been integrated at increasing rates into Russia's military arsenal for the purpose of successfully waging a space war against a near-peer rival. Now that the Russo-Ukraine War is underway and the Russian military has struggled to accomplish its strategic goals in the conventional realm, Moscow has the capacity – and will have greater incentive – to escalate its war in Ukraine against the U.S. and its NATO partners in space.

Since President Vladimir Putin's rise to power, there has been a clash of visions for how the world order should operate. Washington and its allies were content with the unipolar world order the U.S. crafted after the Cold War; Moscow and its Chinese allies were not. Space becomes the most likely arena in which the first shots of any potential conflict between Russia and the West will be fired.

Policy Implications

- The longer the Russo-Ukraine War drags on, the more likely Russia is to risk escalation against the United States in space.
- Because the U.S. relies on satellites for its military operations and because Washington has not provided adequate defense for these systems, Russia has organized its forces to fight a space war.

A Russian Proton rocket carrying Russian satellites blasts off of Kazakhstan's Baikonur cosmodrome on April 28, 2014. (AFP via Getty Images)

Key Takeaways

- Space plays a critical, often unrecognized role in U.S. military operations and American economic transactions.
- Russia is preparing to hold U.S. space systems hostage as part of a larger plan to ensure victory in the Russo-Ukraine war.
- Putin is foreshadowing his intentions, but the West is not listening. It is in this context that U.S. and allied satellites are most vulnerable. Should the U.S. military and its allies lose access to their critical satellites, the military situation in Ukraine and Europe reverses in Russia's favor entirely.

Recommendations

- The U.S. government must view space as more than an extension of U.S. airpower. A doctrine of space dominance and robust space-based missile and satellite defenses must be constructed to deter Russian aggression against critical U.S. satellite constellations.
- A greater embrace of the SpaceX Starlink satellite model for survivable satellite constellations in a time of war is essential if the United States is to maintain its critical satellite capabilities during a space conflict.
- Greater investment must be made to protect U.S. space systems, such as the creation of defensive satellite swarms.
- The U.S. must also make its satellites more interoperable with those of its allies to prevent a total loss of capabilities in the event of a catastrophe.
- Congress must approve a massive infusion of funds into a national space-based missile defense system, in light of increased nuclear threats from both Russia and China as well as Iran and North Korea.
- A legal framework that updates the old international legal regime for space must be created. The Artemis Accords are an excellent basis for such a framework.
- Washington must declare that an attack on critical U.S. satellite constellations would constitute an act of war.

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Illustration by Mark Garlick / Science Photo Library via Getty Image

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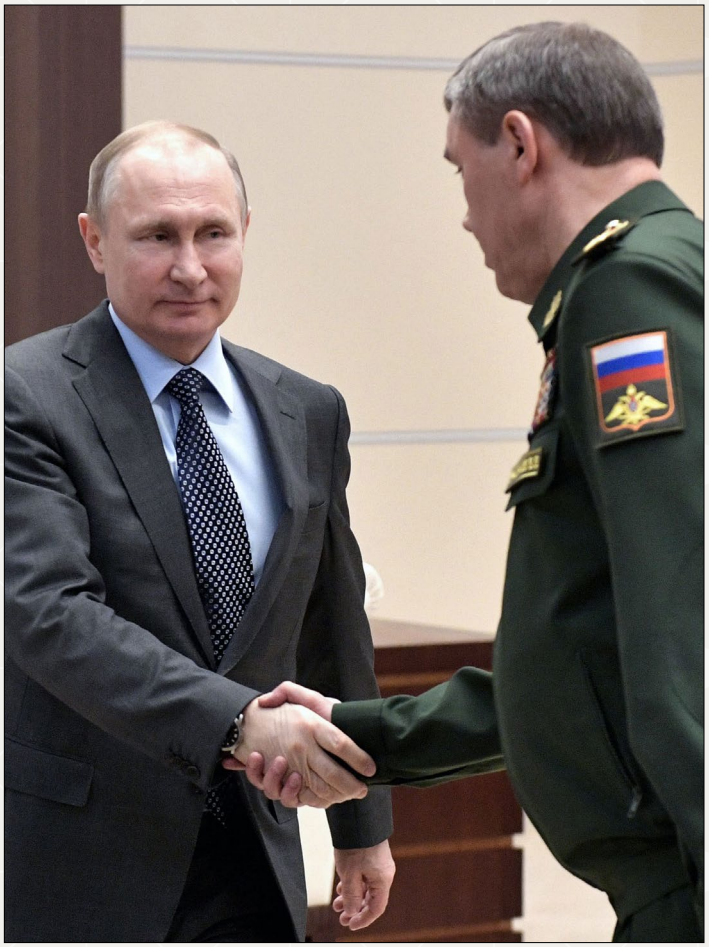
COVER PHOTO: Illustration depicts an anti-satellite missile fired from the ground on a trajectory to destroy an orbiting satellite. (Mark Garlick / Science Photo Library via Getty Images)

Russian Counterspace Capabilities and Intentions

Russia has demonstrated a wide array of military capabilities in the strategic high ground of space that could be deployed to attack the United States and its NATO partners. For example, in 2018 the French government accused the Russians of using one of their co-orbital satellites, codenamed "Luch-Olymp," of "getting so close that [the French government] might have imagined it was trying to intercept our communications." It is likely that the Russians were demonstrating a key capability that they would employ during a conflict with the West, such as the one being waged over Ukraine. Meanwhile, the U.S. government has accused the Russians of "developing anti-satellite weapons" that act "very abnormal" in space. These systems may prove decisive in any conflict with the West, as the U.S. and its NATO partners are extremely reliant on satellites that are highly susceptible to attack and disruption by the kind of systems Russia is currently deploying in orbit.

Since 2018, when Russia began deploying a large number of complex anti-satellite capabilities at an increasing rate, Washington and its NATO partners – notably France – have started to look to space as a potential domain from which hostile actors will seek advantage over the Western military alliance in a time of crisis or war. Yet recognizing this threat and acting to remove these dangerous vulnerabilities have been two different things. The creation of the Space Force as a new branch of the U.S. Armed Forces in 2018 was supposed to be the first step in a series of steps toward ending the threat.

According to defense appropriators such as U.S. Rep. Betty McCollum (D-MN), however, the organization's efforts at reforming the way new satellites are developed and deployed have been "disappointing so far." Retired U.S. Air Force Gen. John Hyten, one of the strongest advocates for a robust U.S. military role in space over the course of his long career, believes the Space Force has not achieved its most basic objectives and American satellites continue to be tempting targets for rivals. The French, for their part, are much farther along in their efforts to better defend their space systems than the Americans or any other



Russian President Vladimir Putin shakes hands with Chief of the General Staff of the Russian Armed Forces and First Deputy Defence Minister Valery Gerasimov during a meeting outside Moscow in April 2018. (Alexey Nikolsky/Sputnik/AFP via Getty Images)

member of NATO. Still, without Washington's critical leadership, NATO will be unprepared for the kind of assault in space that Russia likely intends to execute.

On March 24, 2018, Russian Chief of the General Staff and First Deputy Defense Minister Gen. Valeriy Gerasimov gave a speech to Russia's Military Academy of the General Staff in which he defined the modern Russian military view on space warfare. Gerasimov is an important figure in Russian military circles, and Russia's unofficial unconventional warfare doctrine is named after him. Gerasimov has been an essential strategist for Russia's ongoing war in Ukraine as well. In his 2018 speech, Gerasimov explicitly outlined how Russian troops "were being outfitted with

systems of electronic warfare against aerospace means, navigation, and digital radio communications. Means of counteracting precision weapons are being perfected." Gerasimov explained how his forces were being retooled to launch more effective attacks on enemy satellite constellations, too. He concluded his remarks by arguing that space is likely to become a place in which physical combat takes place in future wars. Given Russia's robust investment in its space warfare capabilities, it is clear that the Kremlin has taken Gerasimov's space strategies to heart – and Washington should as well.

U.S. Air Force Lt. Gen. Leah G. Lauderback, who is the senior intelligence officer for the U.S. Space Force intelligence, surveillance, and reconnaissance "enterprise," told the press in April 2022 that Russia presents itself to U.S. intelligence as an "unknown" threat in the domain of space. As the general assessed, "If [Russia] is boxed into a corner," it may act in unanticipated ways – particularly since Russia, unlike either the United States or China, is nowhere near as dependent on space for its basic military and civilian functions. In 2020, Pavel Luzin reported in Defense News that "Russia has more than 160 satellites; this number includes about 100 military spacecraft." That may seem like a large number. In terms of modern space operations, it is not. China has many more satellites than does Russia. As Luzin assessed, Beijing possesses "320 satellites, including almost 105 military spacecraft." Therefore, China is the world's second-largest user of space (behind the United States), whereas Russia is a distant third.

Having fewer satellites in orbit makes Russia less vulnerable to the kind of space attack that Moscow seeks to threaten the Americans and their NATO allies with. The reasons for this are varied and can be traced back to the Cold War. Back then, despite the fact that the Soviet Union placed the first satellite, *Sputnik,* in orbit, Moscow focused heavily on anti-satellite (ASAT) weapons development to try to prevent its rivals from gaining access to space, while Washington fixated on building satellites for surveillance and communications purposes (and eventually for navigation). When the Soviet Union collapsed, there was a bounce in Russia's satellite sector as the West increasingly integrated Russia into the overall global space sector, though Moscow still lagged the West.

Now that hostilities between Russia and the West are at a height unexperienced since the Cold War, what was once a strategic weakness has been crafted into a strategic advantage: Should the U.S. and its allies subject Russia to a crippling ASAT attack, the Kremlin can rest assured that this form of attack will not be as debilitating for Russian forces as a similar attack would be for the Americans and their partners. Thus, launching a devastating space war upon the United States and its NATO allies to deprive the Ukrainians of Western support is highly attractive to Russian leadership, especially as their war in Ukraine drags on.

Russian President Vladimir Putin has staked much of his reign on the notion that he will restore the purportedly lost greatness of Russia. An integral component of this strategy is returning former territories with large numbers of Russian-speaking minorities, like Ukraine, to Russian control. While Putin can likely withstand not capturing Ukraine's capital of Kyiv or Western Ukraine, the idea that he might lose Eastern Ukraine, where a large Russian-speaking population lives and which has been under nominal Russian control since 2014, is a non-starter for him.

Already, top Ukrainian leaders like Foreign Minister Dmytro Kuleba are publicly insisting that Ukraine be given the weapons from NATO that it would need not only to prevent a Russian invasion of Central and Western Ukraine but also to evict the Russian invaders from the east, which has been denied to Kyiv for almost a decade. Should the West follow through on this and feed into the ambitions of some of Ukraine's leaders, Moscow will likely take drastic steps that it has otherwise avoided, and the risk of a counterspace attack from Russia against American and NATO satellites will increase. If Putin loses Eastern Ukraine, he will be made to look weak at a time when Russia is struggling as a result of the invasion, and he is unlikely to accept that humiliation without a fight.

History of Russia's Space Ambitions

The Russian Federation inherited the impressive space capabilities of the former Soviet Union, although it was unable to pay for the space program's upkeep. During the 1990s, when the West rightly feared that hard-pressed Russian scientists would sell both their

Timeline: U.S.-Russian Hostilities in Space

Dec. 1991: The Soviet Union falls. Western defense firms rush to backstop and fund the flailing Russian space program out of fears that Russian scientists might otherwise sell technology to rogue states.

May 2000: Vladimir Putin begins his first term as president of the Russian Federation.

2002: After years of assistance to the Russian defense and space sectors, the U.S. Army awards a contract to Aviaconversiya Ltd. The U.S. later learns that Aviaconversiya sold satellite jammers to Iraq.

2009: Russia successfully blinds a Japanese satellite using a high-energy laser system.

2011: Russia begins building a laser system under the codename "Kalina."

May 2012: After four years as prime minister, Putin returns to the presidency of the Russian Federation, vowing to restore the greatness of Russia.

2014-15: Russian hackers employ malware attacks on commercial satellites.

2014-2017: Russia routinely jams GPS signals during the conflict over control of Crimea with Ukraine.

2015: Russia supplies satellite jamming technology to Syrian dictator Bashar al-Assad's Syrian Arab Army.

2015: Russia's Luch co-orbital satellite gets dangerously close to an Intelsat in geosynchronous orbit, the farthest orbit around the Earth, where many of the world's most powerful militaries operate essential satellites that are hard to replace.

A Russian rocket carrying the Luch satellite prepares for launch in September 2015.

March 2018: Russian First Deputy Defense Minister Gen. Valeriy Gerasimov outlines Russia's plans to become capable of more effective attacks on enemy satellite constellations.

Putin [C] and Gerasimov [R] observe Vostok 2018 military exercises.

April 2018: U.S. drones over Syria are affected by Russian GPS jamming.

Nov. 2018: During NATO's Operation Trident Juncture exercise, massive GPS outages are reported. Russian jamming is believed to be responsible.

Dec. 2019: The U.S. formally announces the creation of its Space Force.

Nov. 15, 2021: During escalating tensions with West over Ukraine, Russia conducts a risky ASAT test that could have destroyed the International Space Station.

The International Space Station viewed from the SpaceX Crew-2 spacecraft on Nov. 8, 2021.

Nov. 29, 2021: The Kremlin warns that it can simultaneously destroy all 32 GPS satellites with the weapon it tested on Nov. 15.

Feb. 24, 2022: Russian invasion of Ukraine begins. The Russian military targets western satellite and hacks Viasat ground terminals in Eastern Europe (including Ukraine).

April 2022: Through an arrangement with USAID, SpaceX donates over 3,000 Starlink terminals to Ukraine.

Sources: Brandon Weichert, other open-source information, CSIS

Photos from Getty Images, NASA

expertise and sophisticated Soviet ballistic missile and nuclear weapons technology to terrorist networks and rogue states alike, Washington backstopped the flailing Russian space program. Through innovative legislation like the Nunn-Lugar Bill and dynamic organizations such as the Defense Threat Reduction Agency, the United States moved in to fund the bankrupt Russian space agency on the order of billions of taxpayer dollars per year to keep their experts from selling their advanced skills to the highest bidder on the black market. Meanwhile, as commercial opportunities in space were just beginning to be explored by Western entrepreneurs, the dying Russian rocket program was reinvigorated to become the "Wal-Mart of rocket launches," in the words of space analyst James Clay Moltz.

The byzantine Soviet defense sector was then reorganized with copious Western assistance to become more cost-effective and efficient in its research and development programs for the Russian military. Thanks to the assistance of Western firms throughout the 1990s, during Russia's post-Soviet reorganization firms like Avianconversiya, Ltd., were formed. Avianconversiya even won U.S. Army contracts. Despite the era of good feelings between Russian and U.S. leaders during this time, Moscow couldn't help itself. As this author reported in 2020, Russian defense and aerospace companies like Avianconversiya used American largesse to gain access to sensitive, advanced U.S. military capabilities and to then double dip: At the same time that Avianconversiya had won critical U.S. Army contracts, it had also signed a defense contract with Saddam Hussein's Iraq.

When the U.S. invaded Iraq in 2003, American intelligence was shocked to discover that Avianconversiya had created six sophisticated satellite jammers and sold them to the Iraqis. Russian-built satellite jammers were likely perfected with information Avianconversiya gleaned from their work with the U.S. Army (information they planned on using against the Americans at some point). The Russians sold Iraq these satellite jammers to test the technology against state-of-the-art U.S. military systems during the stress of battle. Washington understandably downplayed the threat that these six jammers posed to the U.S. invasion forces in 2003 but nonetheless targeted them during its opening wave of airstrikes on Iraqi targets, so it is likely that the threat was far more significant than the U.S. military was letting on publicly.

Since that time, Russian counterspace capabilities – notably in the jamming realm – have only increased. The systems that the Russians have built for their military and civilian space programs have been considerably enhanced, thanks to the generosity of Western governments and companies. In turn, Moscow built systems intended to stymie the U.S. military's ability to project force globally. To test these various systems, Russia sold them to a variety of U.S. rivals, such as Iraq, Bashar al-Assad's regime in Syria, and the Islamic Republic of Iran.

From the collapse of the Soviet Union until very recently, the Russian aerospace and defense sectors were woven into the global supply chain for space operations, much as the West worked China into the global economy and supply chain (with similarly disastrous results for U.S. national security). Today, Russia can fully challenge the Americans in the critical domain of space. Now that the Russians have engaged Ukraine in open warfare, and with NATO giving copious amounts of military assistance to the Ukrainian forces defending their homeland, Russian military systems intended to deprive the Americans and their allies of access to space are being deployed in earnest against the West.

Russia's Offensive Space Capabilities

Official Russian military counterspace doctrine claims that their military efforts in space are purely defensive and aimed at preventing a rival power (meaning the United States) from gaining advantages over Russia. The systems Moscow has developed for space warfare, however, are hardly defensive. Russia's military has developed devastating satellite jammers and techniques for tricking GPS satellites into relaying false coordinates to terminals receiving directions from the GPS, a tactic known as "spoofing." Russian co-orbital satellites began harassing U.S. reconnaissance satellites at the start of the invasion of Ukraine, clearly indicating where Russia plans on taking this conflict if things continue escalating between Washington and Moscow.

> “Should those sensitive satellites be destroyed or their operations disrupted for any significant amount of time, Moscow could believably launch a devastating fusillade of nuclear strikes against an assortment of Western targets – including targets within the United States itself ...”

Even before the Russian invasion of Crimea in 2014, though, Moscow had intensified its development of counterspace capabilities.

Russian capabilities in counterspace have exponentially increased since 2009’s attempt to dazzle a Japanese satellite. Since 2014, the year that Russia invaded Crimea and annexed it from Ukraine, there has been a direct correlation between Russian military operations in space with larger Russian military operations on land, at sea, in the air, and across cyberspace. These increased capabilities pose a serious threat to the Western alliance that is evolving with each year.

The Russian definition of “defensive” is changing, especially as U.S. signals intelligence is increasingly used by Ukrainian forces to destroy sensitive Russian military targets and kill Russian personnel in combat. The Kremlin has already argued that it views any U.S. and NATO involvement with Ukraine’s defense, whether it be the resupply of Ukrainian forces or the use of U.S. intelligence to better Ukraine’s warfighting capabilities against Russia, as an act of aggression. Thus, the case for escalating their war in Ukraine by targeting sensitive U.S. satellite constellations in the strategic high ground of space is already implicitly being made by senior Russian policymakers.

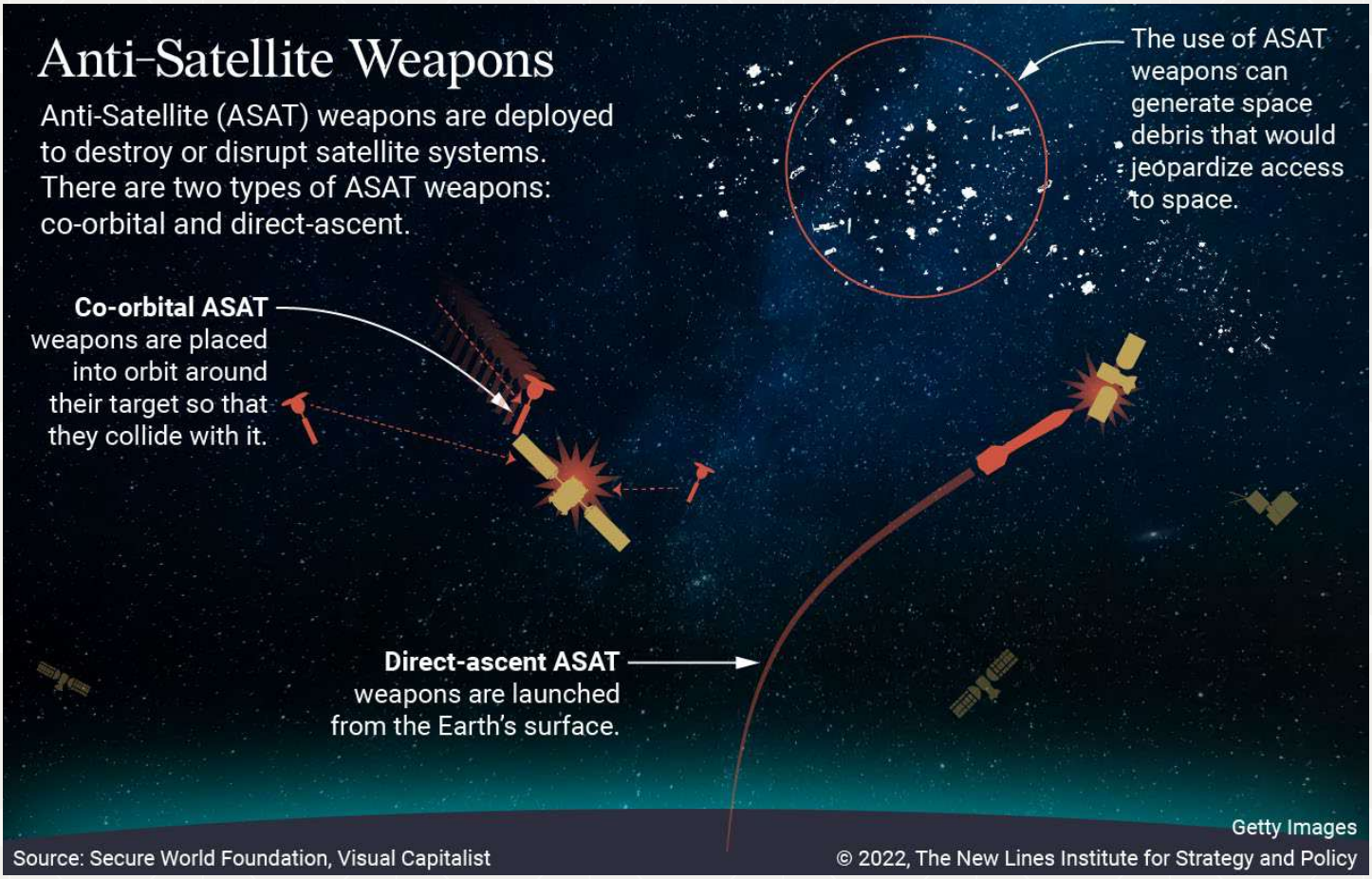
Russian Intentions in Space

Russia has proven itself to be a destabilizing power with its investment in unconventional warfare capabilities. In 2020, the Russians conducted a sweeping cyberattack (known as the “SolarWinds hack”) against the National Nuclear Safety Administration, a semi-autonomous wing of the Department of Energy that is charged with safeguarding America’s nuclear weapons arsenal.

While U.S. government officials claimed that the hack did not affect the agency’s mission, the fact remains that Russia took the extraordinarily provocative steps of hacking the organization. Had Moscow’s cyber forces been effective, they could have theoretically taken control of the weapons or simply prevented Washington’s policymakers from having reliable control over the arsenal, enabling the Russians to strike the United States or its allies while possibly avoiding American nuclear reprisals.

Washington’s nuclear weapons deterrent also is vulnerable in space. A series of nuclear command, control, and communications (NC3) satellites orbit high above the Earth – critical links between policymakers and nuclear forces. Should those sensitive satellites be destroyed or their operations disrupted for any significant amount of time, Moscow could believably launch a devastating fusillade of nuclear strikes against an assortment of Western targets – including targets within the United States itself – and not have to worry about an equally devastating reprisal. The SolarWinds hack and Russia’s intensive interest in counterspace warfare indicate Russian strategic intentions in space. It isn’t just blinding reconnaissance satellites, damaging GPS networks, and disabling communication systems in orbit. Moscow seeks a comprehensive space warfare capability that both deprives the Americans of access to space and removes the threat of America’s nuclear deterrent to Russia – rendering the United States and its allies helpless in the face of increased Russian aggression.

As the Pentagon’s 2019 Missile Defense Review explains, “Russia maintains and modernizes its longstanding strategic missile defense system deployed around Moscow, including 68 nuclear-armed interceptors [launchers that are loaded and reloaded from underground], and has fielded multiple types of



shorter-range, mobile defense systems throughout Russia." This, taken together with Russia's ongoing attacks on critical U.S. defense infrastructure, indicates a growing, comprehensive strategy of escalation dominance and defense on Moscow's part.

Whereas Moscow has embraced an all-of-government approach to counterspace warfare, the U.S. government has not – even with the official creation of the Space Force. There have been disparate efforts to increase the survivability of existing American satellite constellations as well as to design countermeasures meant to stunt Russia's growing counterspace threat, but these efforts have lacked the leadership, support, and vision that the Russian efforts have possessed. In fact, there is an overwhelming desire within the U.S. government (and from within the scientific and academic communities) to create an updated set of comprehensive laws and treaties for diminishing the prospects of a space war. While it is tempting to believe this effort would ameliorate the threat, given how long and how much investment has been made by Moscow into developing its counterspace capabilities, it remains unlikely that Moscow will be deterred by any agreement – formal or otherwise – made with the U.S. and its allies to slow the development of space weapons.

Moscow also intends to hold the United States hostage by undermining Washington's otherwise reliable nuclear deterrence through cyberattacks directed against the parts of our government that manage our nuclear weapons arsenal as well as with potential physical attacks directed against our vulnerable NC3 space systems. From there, Moscow will further protect itself against whatever nuclear reprisal the Americans muster – however limited – with their rudimentary missile defense shield.

The U.S. has yet to recognize and properly formulate a defensive policy against Russia's counterspace threat.

A Series of Escalations

Even before the Russian invasion of Ukraine, space was where the Russian military started its aggression. In November 2021, while a crew of American astronauts and their Russian cosmonaut colleagues slept on the International Space Station (ISS), a Russian Nudol-class ASAT weapon blasted into orbit from the Plesetsk Cosmodrome in northern Russia and obliterated a derelict Soviet era satellite. The crew of the ISS were forced to take refuge in escape vehicles because mission control, which had not been notified by Moscow, was concerned that the debris generated from the Russian ASAT test might have posed a direct threat to the ISS and its crew. Ultimately, the debris field did not damage the ISS. Nonetheless, the ASAT test in November 2021 was likely a message of deterrence: If you Americans attempt to interfere with our war in Ukraine, Russia reserves the right to challenge you in space.

The United States relies disproportionately on satellites to give its military unprecedented, instantaneous global communications, control, and surveillance capabilities. Without these vital-yet-vulnerable systems, the military would be sent back to the 1970s technologically – an outcome that could lead to the United States suffering its first real strategic defeat in the modern era.

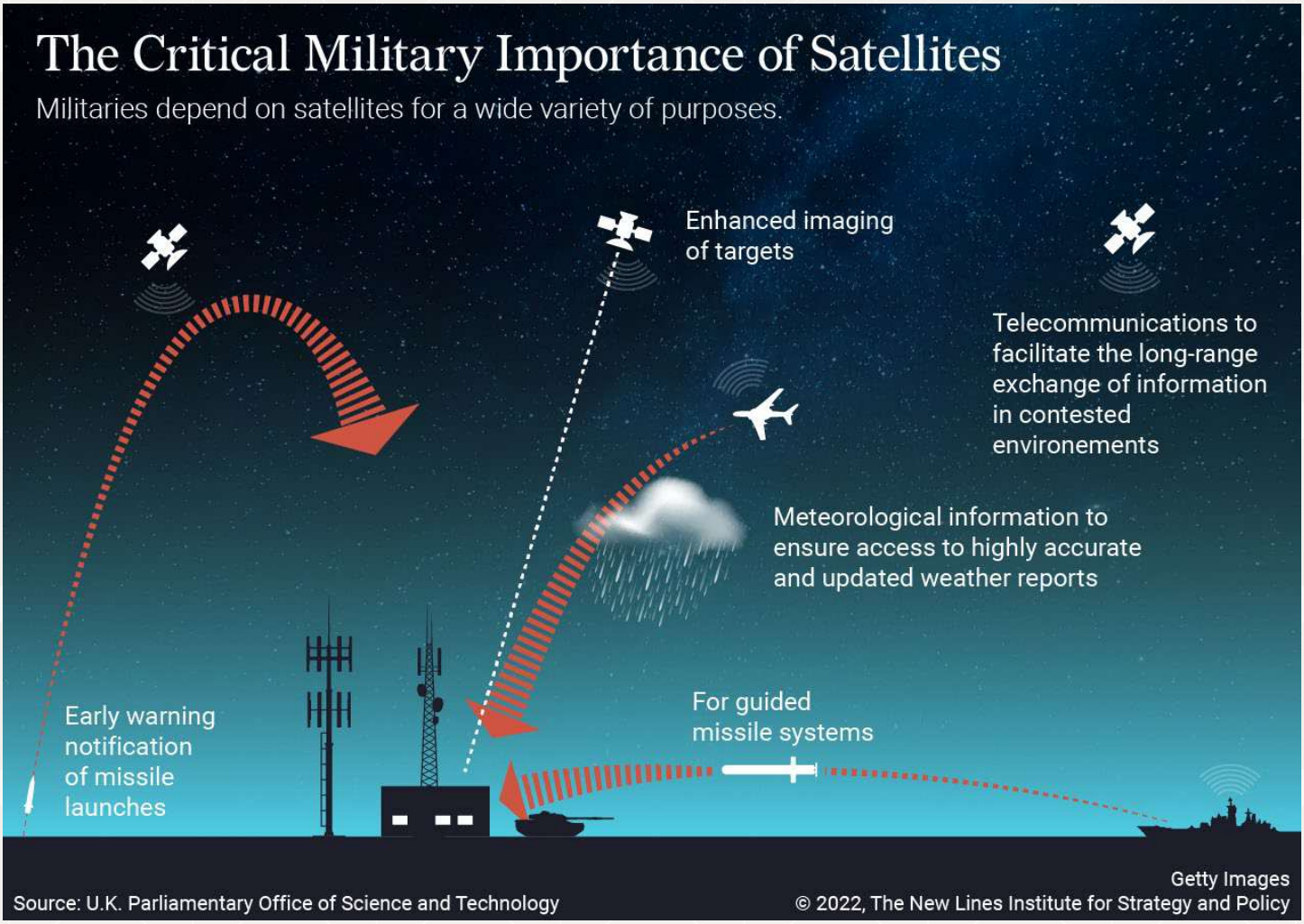
At the outset of the Russo-Ukraine War, it was reported that Russia targeted the U.K. satellite internet provider Viasat with a cyberattack offensive that disrupted the functioning of Viasat terminals throughout Europe. Russia was specifically attempting to disrupt Ukraine's telecommunications capabilities on the eve of the invasion; the Viasat attack commenced precisely one hour before Russian forces crossed the border into Ukraine and initiated the invasion. U.S. Secretary of State Antony Blinken assessed that Russia's aim with its Viasat cyberattack was to "disrupt Ukrainian command and control during the invasion, and those actions had spillover impacts into other European countries."

Russian military doctrine calls for the suppression of an enemy's electronic communications. Degrading and depriving a rival of their access to the global telecommunications system, Russian strategists believe, will help Russia to both isolate a targeted country – like Ukraine – from their allies electronically and assist Russia in winning the information war. Moscow's targeting of Viasat was key as Ukraine relied heavily on the U.K.-based firm for critical electronic communications.

The Viasat attack was not the only example of Russia's military migrating its war against Ukraine into space. After Ukrainian leaders made a public plea, SpaceX president Elon Musk donated 40 Starlink satellite terminals to Ukraine and in so doing made SpaceX a target of Russia's escalating attacks in space. According to Dave Temper, the Pentagon's director of electronic warfare, Russia has waged a sustained cyber offensive against the operating systems of various Starlink satellites in orbit, though the attacks have thus far been defeated by the company's cyber defenses, which are so thorough that the Pentagon has described them as "eye-watering."

The Starlink program was developed by SpaceX to beam high-speed internet into parts of the world lacking the physical infrastructure to support internet access. A key aspect of the Starlink project that makes it unique is that the satellites that are part of the constellation are relatively smaller and simpler than other communications satellites. Because of this design, the Starlink satellites are easier to replace and cheaper than their conventional communication satellite counterparts. Their small size means that they can be deployed on a reusable rocket, lowering the costs of these systems, and their simple design increases their survivability. When more conventional communication satellites, which are larger, more complex, and therefore more expensive, are either attacked or damaged, their loss becomes catastrophic to the users of those satellite systems. However, when Starlink loses satellites, these systems can be easily and quickly replaced, meaning it is extremely difficult to deprive those who rely on Starlink (such as Ukraine) from access to global telecommunications.

Space has remained a secondary theater of conflict in Russia's invasion of Ukraine. Yet, as time progresses and Western military aid to Ukraine continues – thereby negating any chance Russia has for victory in Ukraine – the likelihood that more devastating strikes against Western satellites by Russian space forces increases. This is especially true if one considers



that Russian Foreign Minister Sergei Lavrov, a close confidant of Putin, has been vocal in public about his government's anger over NATO's continuous military and financial aid to Ukraine. The Kremlin has asserted that NATO's military supply chains into Ukraine are "legitimate targets" for the Russian military. While many in the West may assume these remarks are mere bravado on the part of the Russian government, it should be noted that Russia's Armed Forces launched an experimental hypersonic cruise missile at the western Ukrainian city of Lviv, a key exit point for NATO's military supply chain emanating from neighboring Poland.

It is also important to understand that the Russian government has totally committed itself to conquering Ukraine. While many analysts remain skeptical of Moscow's intention of pursuing military objectives beyond their initial holdings in the Russian breakaway provinces of Eastern Ukraine, reports indicate that Russian forces have regrouped since the NATO-backed Ukrainian military routed Putin's initial invasion attempt at Kyiv. In recent weeks, Russian forces have intensified their push into Southern Ukraine and are poised to capture Odesa, from where many believe that Putin will create a land bridge linking Russia with the Russian-speaking Transnistrian region of Moldova.

It also appears that Russian forces have not abandoned their original aim of capturing Kyiv. As The Washington Post recently reported, Russia attacked Kyiv "for the first time in weeks" as part of a larger offensive in the south. Recent videos from Ukraine on various social media outlets show large numbers

of Chechen troops marching in Ukraine, wearing jackets emblazoned with the words "To Kiev!" on their backs. Thus, it is likely that recent reports of Russian withdrawals from their Kyiv and Kharkiv axes of attack do not represent the abandonment of their goal of capturing Ukraine's iconic capital city. Instead, it likely shows the Kremlin's need to shift limited forces away from targets that may for the moment be beyond the reach of Russian forces but over time will become a more practical target for Russia. This would be especially true if Russia manages to capture Odesa.

The longer the war lasts, the more likely it is that Russia will seek to escalate elsewhere, using unconventional means – such as in space against U.S. and NATO satellite constellations, which are the backbone of NATO's military supremacy in Europe.

The Coming Space War

If Russia is to achieve victory in Ukraine, then it is only a matter of time before the Russians determine that they must decouple Western aid from Ukraine. Striking U.S. satellites would be one such way Moscow could accomplish this. Russian co-orbital satellites could surprise unsuspecting U.S. satellites by latching onto them with powerful grappling arms and then pushing those satellites out of their orbits. Nudol-class ASATs could be launched suddenly from Plesetsk and obliterate key U.S. surveillance satellites in low-Earth orbit, creating a catastrophic debris field that could further deny the Americans – and most of humanity – access to space for the foreseeable future. If this were to occur, the NATO advantage in Ukraine would be eradicated, leaving the Ukrainians without the support and cover that NATO has thus far provided them – which could fundamentally change the trajectory of the war.

Of course, the U.S. is not an incapable actor in space. Technically, it remains the world's top space power, with Russia in second place. The U.S. certainly can deploy systems meant to better defend its vulnerable satellite constellations to better deter Moscow from risking escalation in the strategic domain of space. Nonetheless, aside from a few instances of U.S. co-orbital satellites being deployed over the years, with the exception of a handful of military exercises in which American and NATO forces trained without their traditional reliance on GPS signals, the Western alliance is poorly prepared to respond to a Russian counterspace assault. Factor in the grand strategy that Russia's leaders have created to guide their forces in a possible space war against the Americans and their allies, and Washington is presented with a real threat that it is poorly attenuated to and/or is unwilling to address. Without proper leadership and resourcing, whatever technological means for better protecting U.S. satellite constellations that U.S. military may have will prove to be irrelevant if those capabilities are not married to an actual strategy – which they presently are not.

Russia's other advantage in a space war is its relative lack of dependence on satellites. The threat of reprisal is a key element in effective deterrence and the cornerstone of all U.S. grand strategy, but if Russia can survive without access to its satellites while the United States cannot, the prospects of winning a space war are in Moscow's favor. This is especially true if Russian space forces strike the United States in space first: Once a satellite or a satellite constellation is lost in combat, it becomes a cascade of loss that eventually negatively impacts all of a nation's satellite constellations. So, whoever fired first in a Russo-American space war would likely win.

From the outset of Russia's invasion of Ukraine, little thought was given to logistical elements essential to Ukraine's successful conduct in the war. The initial Russian push toward Kyiv was an unmitigated disaster for Moscow, but the war has since shifted. Ukrainian forces went on the offensive, pushing into Russian-held Eastern Ukraine and battling for the contested coastal areas of Southern Ukraine. These regions were less amenable to the Ukrainian military – especially as NATO resupply became trickier because the operational tempo and demand placed on limited Western military supplies outstripped the ability for NATO members to replenish these systems reliably.

Putin gave a rambling – albeit menacing – speech in July in which he mocked the Western alliance, saying, "Everybody should know that largely speaking, we haven't even yet started anything in earnest." On the issue of a much-ballyhooed peace negotiation between Kyiv and Moscow, Putin refused to outright decline any such attempt, although he warned ominously, "The

> “In March, a Russian rocket emblazoned with the letter ‘Z,’ a symbol that many analysts associate with Russia’s campaign of aggression in Ukraine, blasted into orbit. … Most observers believe that the rocket carried into orbit a new Meridian-M military satellite designed to facilitate better communications between Russian ground forces and Russia’s navy operating in the Black Sea.”

longer [the war] lasts, the more difficult it will be for [Ukraine] to make a deal with us.” It is evident that Putin intends to invoke the classic Russian military doctrine of “escalate to de-escalate.” If, as Putin’s speech insinuated, the Russians have not yet begun to fight, it raises the question of what else Moscow could do.

Given that the bulk of Russia’s conventional forces are already committed to Ukraine, the only places to escalate are in the unconventional realms. Russia’s vicious paramilitary arm known as the Wagner Group is heavily deployed throughout Ukraine. Moscow is set to receive a fleet of Iran’s weaponized drones (many of which are based off pilfered American drone designs) that will undoubtedly be deployed in Ukraine soon. The Kremlin has made a bevy of nuclear weapons threats toward several Western states. So, Russia’s probing of the unconventional realms is proceeding apace.

In March, a Russian rocket emblazoned with the letter “Z,” a symbol that many analysts associate with Russia’s campaign of aggression in Ukraine, blasted into orbit. The Z symbol appearing on the side of the rocket in question raised concerns among Western space observers who worried that the launch was tethered to the ongoing conflict in Ukraine. Most observers believe that the rocket carried into orbit a new Meridian-M military satellite designed to facilitate better communications between Russian ground forces and Russia’s navy operating in the Black Sea. This was followed in May by the launch of another military satellite with “Z” painted on the side. This time, the classified satellite payload, designated “Kosmos 2555” but believed to be part of Russia’s next-generation military reconnaissance satellite constellation (known as “EMKA”), was placed into an irregular polar orbit by an experimental Russian Angara 1.2 rocket.

This was a proof-of-concept mission. It not only deployed a mysterious military payload in an odd orbit (most satellites do not follow a polar orbit) but it did so on a rocket system that the Russians have wanted to utilize since the 1980s. In fact, the Angara 1.2 rocket “can place a payload of more than [6,600 pounds] into low-earth orbit.” Development stalled in the years following the tumultuous collapse of the Soviet Union, but the rocket’s promise as major carrier – both for military and commercial purposes – was too much for Moscow to pass up. The Russo-Ukraine War expedited Moscow’s decades-long desire to deploy this launch vehicle.

Russia’s invasion of Ukraine has forced Moscow to think differently and to apply unconventional strategies in the strategic domain of space. They’ve used the war as an excuse to enhance their military satellite capabilities and as a reason for deploying cutting-edge rockets that could revolutionize the launch business. These are complications for the West, but they are not necessarily direct threats. For that, one must analyze Moscow’s development of their co-orbital satellites and other counterspace weapons.

In Russia’s far southwest, at a facility known as Krona run by the Russian Ministry of Defense, a covert laser system designed for “electro-optical warfare” under the codename of “Kalina” is being built, according to financial documents obtained by researchers at The Space Review as well as open-source satellite imagery.

By aiming a laser pulse at the optical gear of satellites passing overhead, Kalina can "permanently blind" Western satellite constellations.

The construction of Kalina underscores another key component that might be poorly understood by American analysts. While many are understandably fixated on Russian co-orbital satellite capabilities and their direct-ascent kill vehicles (essentially surface-to-air missiles that can track and destroy satellites in low-earth orbit), the concern has always been unintended damage. In fact, this has been a key concern of multiple national security space policy experts in the West, who've often called for extreme restraint on the part of the United States in space out of fear that any other policy would spark an arms race that could lead to a disastrous war in space.

The reason that a potential space war involving kinetic anti-satellite weapons would be so disastrous is because of the debris that such a conflict would generate. In space, debris created by explosions would form lethal projectiles in a constant of motion that would threaten the safe functioning of spacecraft and satellites and, if the debris field were large enough, could deprive humanity of access to space for generations. This is known as the Kessler Syndrome. A laser system like Kalina, though, mitigates the risk of the Kessler Syndrome.

President Joe Biden and a coterie of other Western leaders and intelligence analysts have cautioned about the dangers of escalation from Russia in their current war against Ukraine. The impressive amount of military aid Western nations have rendered to Ukraine has been

decisive in preventing a complete Russian conquest of the country. Yet this aid has prompted Moscow to seek ways to delink Western aid from Ukraine. In their attempt to isolate Ukraine and force Kyiv to surrender, Russian leaders are increasingly interested in space weapons that would cause catastrophic damage for Western militaries while not harming the satellites and spacecraft of nations ancillary to those who are engaged in war against Russia – or to damage Russia space systems. Once the Kalina counterspace weapons system is fully operational, American and NATO satellites can anticipate being subject to a systematic, blinding assault that permanently destroys them. This will effectively knock the Americans and NATO out of the fight in Ukraine – and have far-reaching consequences for Western militaries that will negatively impact its operations throughout the world.

Recommendations

Many space policy experts in the West have fretted over the prospects of a space war. It is not a happy topic, and such a conflict could prove highly damaging to the United States and the world. A new legal regime was proposed by former President Donald Trump's space policy team to ensure the peaceful use of space. Known as the Artemis Accords and grounded in the tenets of the Outer Space Treaty of 1967, this proposal aimed to foster amity among spacefaring nations and ensure that all human activity in space remained peaceful. In fact, there was a section in the Artemis Accords that specifically called for the establishing of de-confliction protocols in space to curb the threat of a space war. Neither Russia nor China will sign the accords. That alone should indicate Moscow's hostile intentions in space.

The United States and its allies must move more fully into space, embrace space weaponization, and establish greater control over and defense of the strategic high ground. The more time wasted by Washington on fruitless diplomatic efforts to get America's rivals to deter themselves from reckless action rather than to commit fully to the robust defense and dominance of the strategic high ground, the more likely it is that the U.S. could lose access to this critical domain.

Even though Washington has been aware of its strategic vulnerabilities in space for many years, it has been slow to implement countermeasures. In 2013, the U.S. Special Operations Command experimented with using cube satellites to assist in their global operations. In a time of space war, using smaller, less-sophisticated satellites that can be cheaply and quickly launched to either enhance or replace the lost functions of more traditional satellites might be one way to keep U.S. forces in a fight. A re-imagining of U.S. satellite architecture is needed now more than ever.

Another move that Washington must make is for Biden to declare that an attack on critical U.S. satellite constellations would constitute an act of war. Should that occur, the United States would engage Russia directly, and Moscow will have opened itself up to severe reprisals – including possibly nuclear reprisals, depending on how damaging the Russian space attack was. This simple declaration could help to deter Moscow from taking risky actions in space to change the trajectory of the war on Earth in their favor.

Policy analyst Brian G. Chow has called for the deployment of American co-orbital satellites to surround existing constellations of American satellites. These defensive satellites would act as "bodyguards" for the larger, more sensitive American satellites. Should Russia attempt to attack the larger American satellites, the smaller co-orbital satellites could interdict and deflect the attacks, protecting the critical American satellites in orbit. Beyond that, American ASAT and co-orbital satellites could be used to actively target Russian satellites.

Further, the threat posed to the United States and its allies from Russia's nuclear weapons arsenal is so pronounced today that there is no longer any excuse for the White House not to demand a massive infusion of funds from Congress to build a comprehensive national missile defense system. According to Brian T. Kennedy of the American Strategy Group, it would cost about $30 billion per year over the course of three years to develop and deploy such a system in orbit using currently available technologies. Today,

the technology exists to build and deploy an effective missile defense shield. What is lacking is national will and political leadership. The Russian threat, however, should galvanize institutional stakeholders into reversing their course and embracing an immediate program for developing and deploying a space-based missile defense system, of the sort that former President Ronald Reagan first envisaged in 1982.

All these things, taken together, would prove decisive in deterring Russia from even risking an escalation in space against the Americans and their NATO partners. Preventing a Russian escalation in space will also likely give Ukraine the time it needs to preserve its victories against Russia and force Moscow into a more conciliatory tone with Kyiv. ☐

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