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Introducing the U.S. Space Force

On December 20, 2019, something extremely rare happened in the United States Armed Forces: An [entirely new branch of service was born](#). For context, the Army, Navy, and Marine Corps were born by acts of the Continental Congress in 1775. The Coast Guard came into being by act of the first U.S. Congress in 1790, and the relatively young Air Force was born by a similar act of Congress in 1947. Clearly, these are very rare events, so it was a historic occasion when Congress authorized the establishment of the U.S. Space Force (USSF) as an independent branch of the U.S. Military just four years ago.

We begin this report by discussing the background of the USSF, including how its birth was similar to that of the U.S. Air Force (USAF) and how its relationship with the USAF is similar to the Marine Corps' relationship with the Navy. We also discuss why a new service branch was deemed necessary and what it says about the future of space warfare. As always, we wrap up with a discussion of the implications for investors.

Similar Births

To understand the birth of the USSF, it may help to recall how an independent Air Force in the U.S. came to be. The USAF was born September 18, 1947; however, in the beginning, it was just a rebranding and declaration of independence from the U.S. Army Air Corps. Aviation as a human endeavor began in the first decade of the

20th Century, and it reached the battlefield for the first time in World War I. It made a name for itself as a decisive force in World War II, but even at that stage, it was the Army, Navy, and Marines who were developing and employing their own air arms, mostly to support their other forces. Still, the experiences of World War II showed that *airpower* was different. It had to be thought about differently, and it had to be employed independently for best results. Additionally, the emerging Cold War and the advent of nuclear weapons introduced a new urgency to the national security equation. The solution was that the U.S. Army Air Corps gained its independence and became the U.S. Air Force.

Similarly, the USSF began as a rebranding and declaration of independence from Air Force Space Command, a component of the USAF. Space exploration as a human endeavor began only about 60 years ago, and space operations reached the battlefield as a peer performer only during Desert Storm (see below). Space assets were a critical enabler during the post-9/11 conflicts, but even at that stage each of the other services (mostly USAF) were using their own space arms to support their other forces. Still, their experiences showed that *spacepower* is different, requires a new kind of thought, and should be employed independently. Additionally, the realization of just how heavily the modern American approach to combat depends on space forces has combined with an emerging understanding of just how vulnerable those forces are to crippling attacks, which necessitated a new approach. Together with a sobering discovery of the progress other

nations are making toward the ability to attack space assets, the national security equation is again changing. The solution was that the Air Force Space Command gained its independence and became the USSF.

Figure 1



(USSF Emblem. Source: www.spaceforce.mil)

Similar Bureaucratic Relationships

To understand how the USSF fits in with the other U.S. service branches, it may help to consider the U.S. Marine Corps (USMC). Although in most respects the USMC is its own, independent branch of service, it is actually part of the Department of the Navy, and the two branches work very closely together. One of the USMC's three primary missions is to support naval campaigns and to defend naval bases. Unlike the other branches, the USMC does not have its own service academy; rather, the U.S. Naval Academy is responsible for providing roughly 25% of its graduating classes to the USMC.

The USSF and USAF have a similarly close relationship. The USSF is part of the Department of the Air Force, and the first USSF bases were USAF bases that had been transferred to the USSF. As with the USMC, the USSF does not have its own

academy; rather, the U.S. Air Force Academy provides a portion of its graduates (initially less than 10% but envisioned to be eventually 25%) to the USSF. The USMC and USSF both have their roots in other branches of the service, but each has its own independent mission, specified in federal law and assigned by the Department of Defense (DoD). Each has its own command and basing structure by which it organizes, trains, and equips its forces. Most importantly, each has its own independent budget under congressional authorization.

Why A New Branch of the Service?

To understand why the U.S. decided to establish a new branch of service for space, it helps to appreciate how much the U.S. military has come to rely on spaceborne assets and space-based capabilities. Spacepower has played an important role since nearly the beginning of space exploration. In 1962, satellite photographs gave the U.S. early warning that the Soviet Union was secretly building nuclear missile facilities in Cuba. In 1991, during Desert Storm (which came to be known as the “[first space war](#)”), more than 60 satellites provided constant coverage of the battle area, furnishing a list of services, including 90% of communications for the 500,000-strong multinational army. Since then, spacepower has become nearly synonymous with the modern American way of conducting military operations. Today, space assets provide soldiers on the ground, ships at sea, airborne aircraft, commanders at headquarters, and national leadership back home constant connectivity with each other, which raises the capability to execute a range of essential tasks to previously unimaginable levels. The growing list of these tasks includes:

- Location of friendly forces;
- Continuous awareness of enemy force locations, movements, and actions;

- Exact targeting information;
- Global weather updates and forecasts;
- Precise navigation;
- Early warning of enemy missile launches; and
- Instant global communication.

This short and partial list of essential tasks enabled by space forces gives a sense of how spacepower revolutionizes the capabilities of the entire U.S. military. Space-based capability has become so thoroughly integrated into U.S. military operations that military leadership considers the prospect of loss of those assets as something that would render our forces crippled and blind.

Our understanding of the decision to establish an independent USSF continues with an assessment of the rapidly growing threat. [Both China and Russia have also established dedicated space forces](#), similar in scope to the USSF in levels of independence, budget, and national commitment. Over the past 10 years, the number of Chinese launches per year and satellites in orbit with military applications has [more than doubled](#). With these efforts, China is rapidly replicating the space-based capabilities that have become hallmarks of the U.S. space program and warfighting model. China's military doctrine specifically prioritizes "space superiority" as a central element of its overall military strategy. As an example, three years ago China completed its own on-orbit constellation of satellites, called "BeiDou," that replicates the U.S. Global Positioning System (GPS).

Figure 2



USSF's unique uniform (Source: www.valorguardians.com)

Meanwhile, although Russia's historically well-developed space program suffered decay during the first two decades after the fall of the Soviet Union, the country has recently made great strides in restoring its capabilities, with a sense of urgency that fully matches that of China. For example, Russia also possesses its own version of GPS, called GLONASS. After having fallen into disrepair in the 1990s, recent efforts have fully restored the system. One key difference in the Russian approach to space is that since Russia views the U.S.'s dependence on space-based assets as its Achilles' heel, it is designing terrestrial redundancies into its overall model of military operations in case enemy action negates its space assets.

It would be less alarming if the Chinese and Russian space programs merely sought to match or exceed U.S. space-based capabilities in support of terrestrial military operations; however, this is not the limit of their efforts. Both China and Russia are actively developing offensive space capabilities designed to destroy or degrade another country's space assets. Collectively referred to as "Counterspace," these capabilities include ground-, air-, cyber-, and space-based systems that target an adversary's satellites with attacks ranging from temporary jamming or sensor blinding to destruction of enemy spacecraft and supporting infrastructure. This means that enemy action against U.S. space assets could be as simple as a temporary denial of service to the complete destruction of key satellites. Imagine being on a trip far from home, and your GPS just stops working. Do you have a map? Do you remember how to use it? How much longer will it take for you to reach your destination? Now imagine being the commander of a military unit using that same GPS to guide your forces to a key location, probably in a foreign land, and you suddenly do not know where you are anymore. To be clear, both China and Russia have already successfully tested weapons designed for these purposes.

The U.S., China, and Russia are merely the leading competitors in an expanding space race. Iran and North Korea are emerging as space challengers aligned against the U.S. Although at present Iran possesses only a limited and unreliable capability to place satellites into low Earth orbit, its space agency and space research center continue to devote significant resources to the effort, which is also receiving considerable Russian assistance. Iran claims to have developed and successfully tested systems that can jam space-based communication and GPS signals. Meanwhile, North Korea has

demonstrated these jamming capabilities; in late 2023, it put a spy satellite into space, and it has announced intentions to launch three additional spy satellites in 2024.

Fortunately, not all competitors in the space race align against the U.S. Key allies such as Japan and France have also established space programs that are working in coordination with the U.S., and India has also made significant strides in recent years, whilst generally cooperating with the U.S.

CONOPS and Budgets

To complete our understanding of the rationale for an independent USSF, let's take a moment to consider two key ideas: Concept of Operations (CONOPS) and budget authority. CONOPS refers to the way that a military plans to use its force. These plans drive vitally important decisions, such as the organizational structure, training methods, and the equipment that gets designed and purchased to accomplish the mission. The evolution of airpower taught us that so long as airpower remained part of the other services its CONOPS remained hostage to the immediate needs of the ground and sea forces that owned them. Once airpower gained its independence, the entire CONOPS changed. It was set free to discover and embrace entirely new (and sometimes decisive) uses of airpower. Today, spacepower finds itself at a similar moment. China and Russia have set their space forces free to think, develop, and act independently; anyone who wishes to compete with them in the high ground of space must do the same.

Ultimately, the power of a military force depends on the power of its purse. As so famously asserted in the 1984 classic film, *The Right Stuff*, "No bucks, no Buck Rogers." In the case of spacepower, history

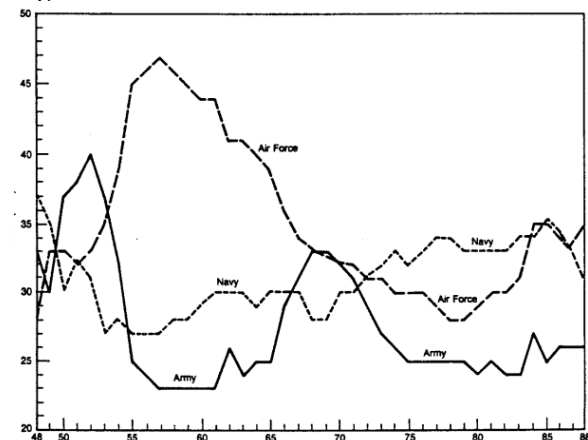
has shown that when the parent services experience budget pressure they reserve their precious funds for traditional priorities (tanks, ships, planes), while shortchanging space. In recent years the USAF, in particular, has chronically underfunded space initiatives to support procurement of next-generation aircraft. By sharp contrast, in the four short years of its life, the budget of the USSF has already doubled. While this growth comes from a very low starting point and has come partially at the expense of the other services' previous space budgets, it still shows the emergence of spacepower as a national priority whose budget will not be pillaged by a parent service with other priorities. The security and growth of this funding simply would not have occurred without the independence of the USSF.

The Future of Space Warfare

Since the USSF is still in its infancy, the natural question is how we should expect it to develop. Historical precedent and present imperative provide guides for our thoughts. The first 10 years of the existence of the [USAF saw an explosive growth in its budget](#). From a beginning of roughly one third of the total defense budget, the USAF budget proportionately peaked in its tenth year, at nearly half of the entire defense budget, after which it gradually receded to roughly one third. This budgetary explosion occurred in direct response to a combination of a high perceived national security threat — the response to which the USAF was considered best suited — and emerging airpower innovations and solutions. The threat was nuclear annihilation at the hands of the Soviets, and the solutions were a massive, independently controlled bomber force and the development and deployment of an entirely new fleet of nuclear-armed missiles. Although bombers were not an innovation of the newly independent USAF,

the CONOPS for their independent employment was. The development of the nuclear missile force was also a truly new, USAF-centric innovation. These developments illustrate how the budget for a new branch of service rapidly grew in response to a national imperative and to fund new programs.

Figure 3



(Source: *U.S. Air Force Budget & Posture Over Time*)

Today, we again face what many in our country consider a national imperative. Our military critically depends on spacepower, but that dimension of power has been recognized as highly vulnerable to attack, and competing world powers are rapidly developing forces designed to take advantage of those vulnerabilities. In response, [we should expect a continued dramatic increase in the share of the defense budget allocated to the USSF](#) for perhaps the next five years. We should further expect that budget to fund a combination of existing capabilities, such as more robust launch facilities and satellite networks, and innovations in spacepower that remain beyond the horizon for those of us not in possession of the right security clearances. In response to this increase of funding and direction of effort, we should also expect commercial industry to match the level of effort and innovation, both within the

companies already familiar to us and in the form of new companies that rise to meet the opportunity.

Although most difference-making spacepower innovations will likely occur behind the veil of secrecy, our research has revealed certain vectors of thought in USSF leadership. A central emerging theme is called, “[Dynamic Space Operations](#)” (DSO). In contrast to traditional “Positional Satellite Operations,” in which space assets occupy a fixed, never-changing orbit, DSO involves the employment of satellites with the ability to move on command from one orbit to another, making it hard for enemy space forces to target and destroy them. Historically, this has been difficult for a host of reasons with one being the increased weight of a satellite that would have the engine and fuel tanks necessary to enable this sort of maneuvering capability. Increased weight translates into a tremendous increase in launch (and other) costs. A new focus on this challenge has led to the next innovation, on-orbit [celestial refueling](#) satellites. Consider that one of the hallmarks of the USAF has been its aerial refueling capability. The USAF not only has a dedicated fleet of hundreds of tanker aircraft that can keep combat aircraft in the battle space far longer than otherwise possible, but it also conducts world-class training programs and possesses decades of experience using this capability. It is truly a core skill of the USAF, just like taking off and landing. Now, the USSF is allocating resources to the same concept for satellites in space, promising to make DSO a reality.

Investment Ramifications

We expect the emergence and initial rapid growth of the USSF to benefit the major defense contractors and commercial space companies with established businesses in launch capabilities (e.g., rockets), satellites,

and the internal systems (e.g., reconnaissance sensors, guidance, propulsion) that compose modern space forces. We further expect that this will be an international effort among the U.S. and its allies, meaning that the benefit will extend to non-U.S. defense contractors, although we caution that the needs of national security could restrict technology sharing across borders, even among allies.

Perhaps the greater opportunity for investment will reside outside of the traditional set of well-known defense contractors. Recent history has shown that newer, space-focused concerns such as SpaceX are more nimbly seizing these opportunities for space-based defense business. Moreover, recent years have also witnessed a growing frustration within the DoD with large defense companies running chronically over-budget and behind schedule on their commitments. In response, DoD has initiated a set of new programs and budget appropriations exclusively available to small businesses and new technologies. We will be watching closely for small-cap, technology-focused companies that seek to gain a place in the emerging space market.

Longer term, it has been the pattern for technologies (e.g., the internet, GPS) that were initially developed for military uses to find their way into a range of far larger commercial, civilian applications. As the military space effort continues, we will be actively investigating the possible military-to-civilian opportunities that will likely emerge.

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