

The Aerospace Divorce:

**What should be the dividing line between the Air Force's space
assets and the Space Force?**

By:

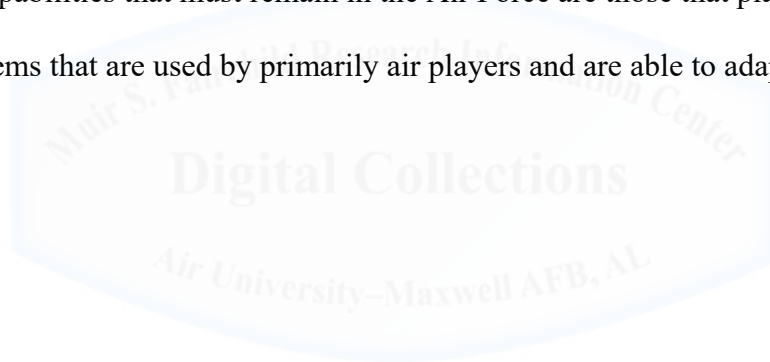
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Executive Summary

A key decision in the process of developing the Space Force is deciding what capabilities should remain in the Air Force. In order to determine where the line should be drawn, I have developed a methodology based on the air kill chain and the space kill chain. The priority for assets moving to the Space Force are those that enable freedom of movement in the space domain, for example those that relate to space situation awareness. The next category for moving to the Space Force is service agnostic space support capabilities such as global utilities like GPS and other missions that are defined by common use by a multitude of entities, like intelligence satellites. The capabilities that must remain in the Air Force are those that play a part of the air kill chain, aka items that are used by primarily air players and are able to adapt to air player needs.



Introduction

With the release of Space Policy Directive – 4 (SPD-4)¹, the Air Force needs to determine the best method to divide space capabilities between a new Space Force and remaining in the Air Force. The paper is intended to provide an effective method for this division. It is not intended to specifically outline every asset in the inventory and place them individually. It will cover examples in each category to provide a framework for future decision making.

The Air and Space Kill Chains

The basis for this theory is the current practice for the division of air, land, and sea capabilities. The Army's main focus is land combat, but it still has air assets and sea assets. The navy has many air assets. What ties these assets to these services is that service's respective kill chain. What makes an asset a part of a domain's kill chain is it is used primarily by that domain's players and able to be adapted to that domain's needs. An example is the Apache. The Army owns this aircraft because it is used in support of ground forces, only effecting the ground war. It does not perform anti-air, participate in the air campaign, or any strategic air capability. It is readily able to be retasked to affect in a different part of the land battlespace if necessary.

While the kill chains of other services are well defined, the Space Force's primarily mission and the space domain are still being defined. Therefore, to use proximity to the kill chain for the Space Force, the Space Force's kill chain must be defined. There are currently multiple definitions depending on the source. The author is defining the objective of the Space Force's kill chain as maintaining freedom of movement in the space domain for US civilian and military assets and maintaining space capabilities in support of the air, land, and sea domains.

¹ Trump, Donald J. Text of Space Policy Directive-4, Text of Space Policy Directive-4 § (2019). Text of Space Policy Directive-4. <https://www.whitehouse.gov/presidential-actions/text-space-policy-directive-4-establishment-united-states-space-force/>

The Three Capability Categories

There are three categories of priority for capabilities moving to the Space Force. The capabilities considered are derived from the joint doctrine JP 3-14: Space Situational Awareness (SSA), Space Control, Positioning Navigation and Timing (PNT), Intelligence Surveillance Reconnaissance (ISR), Satellite Communications, Environmental Monitoring, Missile Warning, Nuclear Detonation Detection, Spacelift, and Satellite Operations².

The first category is systems and missions needed for the space kill chain. The capabilities needed are those related to space launch, space situational awareness, and space control. The majority of space assets will be in the Space Force and it is critical for a kill chain to have the logistical capability to place assets in position. Critical to command and control for the air war is situational awareness of the battlespace. The Space Force will need all assets related to space situational awareness such as the Space Fence³ and the Space Based Surveillance System (SBSS)⁴. As it does in the air war, “SSA also identifies the capabilities needed for protecting US assets and for destroying or disabling those of the enemy.”⁵ Missile Warning ties into SSA and will be discussed later in the paper. The last mission needed for maintaining freedom of movement is space control, which is effectively the implementation of the space kill chain.

The second category for mission sets is space support capabilities that are service agnostic. The capabilities contained in this category are Positioning Navigation and Timing, Intelligence Surveillance Reconnaissance, Satellite Communications, and Environmental Monitoring. These capabilities are all space based and integral to multi-domain warfare. They

² Joint Chiefs of Staff. Joint Doctrine for Space Operations, Joint Doctrine for Space Operations § (2018), II-1 - II-8.

³ Lockheed Martin. “Space Fence.” Lockheed Martin. Accessed October 18, 2019.

<https://www.lockheedmartin.com/en-us/products/space-fence.html>.

⁴ Bell Aerospace. “SBSS.” Bell Aerospace. Accessed October 18, 2019.

<https://www.ball.com/aerospace/programs/sbss>.

⁵ McCall, Gene H, and John H Darrah. “Space Situational Awareness: Difficult, Expensive—and Necessary.” *Air and Space Power Journal*, 2014, 6–16. https://www.airuniversity.af.edu/Portals/10/ASPJ/journals/Volume-28_Issue-6/SLP-McCall_Darrah.pdf.

are a lower priority to move to the Space Force and could be moved later in a phased approach to creating the Space Force. They should be moved before the Space Force is considered fully established because they are not purely a part of the air war kill chain.

There are two subcategories: Global Utilities and Joint Use Capabilities. Global Utility missions provide to both military and non-military customers. The prime example of a global utility is GPS, which provides PNT. It is an integral part of military operations in every step of the aircraft employment, but it is also used throughout the commercial sector from agriculture to finance.⁶ Another aspect of the GPS constellation is a limited ability to quickly provide a significantly increased capability to the warfighter. The many needs of PNT drive planned optimization not short term focusing of capabilities. The need to balance the civilian and military uses of a system and a limited ability to rapidly change functionality means this capability and those similar are not fully tied to the air kill chain. Also covered in the Global Utilities subcategory is Environmental Monitoring and the Satellite Communication purchased from civilian satellites.

The other subcategory of service agnostic space support capabilities is Joint Use or Inter-Governmental Agency Capabilities. Similar to Global Utilities, these capabilities are used by many users but focused on DOD assets that provide to services to US government entities. When describing ISR in the space domain, joint doctrine states, “the CCMDs and the components have access to space capabilities that can collect diverse military, diplomatic, and economic information for planning and execution across the range of military operations.”⁷ An example that expands on the joint / intra-governmental focus of space doctrine is using an earth imaging satellite to assist with Battle Damage Assessment (BDA). The space asset can be used to

⁶National Coordination Office for Space-Based Positioning, Navigation, and Timing. “GPS Applications,” November 24, 2014. <https://www.gps.gov/applications/>.

⁷ Joint Chiefs of Staff, II-4.

confirm destruction of target regardless if the target was struck by the Army, the Navy, Marine Corps, or the Air Force. Satellite Communications is similar to ISR as communication constellations are shared between Army, Navy, and Air Force needs already. This category does not include assets currently controlled by the National Reconnaissance Office (NRO) and similar agencies, though personnel attached to such agencies from the DOD should be predominately Space Force.

The last category covers items that are a part of an air war kill chain. There are two qualifiers needed for a space asset to be considered a part of the air war kill chain: equipment that is used by primarily air players and is able to adapt to air player needs. A theoretical example, a communication satellite should stay in the Air Force if it tied and used primary by one aircraft. The author did not have a specific example and if there are none, then no space assets should stay in the Air Force for the reason of supporting the air war. The capabilities the Air Force needs to maintain internally are going to be interfaces and equipment that leverage space capabilities, such as aircraft that are able to communicate with space assets. The Air Force will also be responsible for developing and communicating future requirements for space assets to aid the air war. This is similar to how the Army and Navy already operate in regards to space, which can be seen in the Army's space operations field manual. "The Army's three broad space policy objectives are: Provide space capabilities and support[,], integrate space capabilities across the force[, and] develop space requirements and capabilities."⁸

Another part of the Air Force's mission is to "organize, train, equip, and sustain forces" is support of nuclear deterrence.⁹ Nuclear Detonation Detection capabilities are a part of this kill

⁸ Headquarters Department of the Army. Army Space Operations, Army Space Operations § (2019), 1-5. https://armypubs.army.mil/epubs/DR_pubs/DR_d/pdf/web/ARN18085_FM%203-14_INCL_C3_FINAL%20WEB.pdf.

⁹US Air Force. Annex 3-72 Nuclear Operations. Annex 3-72 Nuclear Operations. § (2015), 1.

chain and therefore organizations like the Air Force Technical Applications Center¹⁰ should remain in the Air Force. The main conflict with Missile Warning is that it is a part of both the nuclear kill chain and the space kill chain. Intercontinental Ballistic Missiles (ICBMs) and a rocket carrying an ASAT capability are functionally the same at a launch, as demonstrated by the conversion of Minuteman ICBMs to Minotaur rockets.¹¹ A solution is to have the Space Force control space assets related to Missile Warning and establish joint positions manned by officers from Air Force Global Strike Command in units tasked with Missile Warning.

Conclusion

A kill chain philosophy is the best way to determine which assets and capabilities should be moved to the Space Force and which should remain in the Air Force. Capabilities relating to maintaining freedom of movement in space and the space kill chain are priority for moving to the Space Force. The next category of priority is space-based space support assets that are service agnostic. They can be moved at the same time as the first category or later if a phased approach is decided. The identifying characteristics of this category are assets and missions that are used by many players, such as ISR satellites used by many governmental agencies or Global Utilities like GPS. The Space Force covering the first two categories reflects the Army / Air Force division where the Air Force has full control of the air war and has air support assets that aid the ground war. The last category is what should remain in the Air Force, which are assets that are primarily used by air players and are able to adapt to air player needs. There are limited space-based assets that meet these restrictions and the Air Force should adopt mission sets similar to the Army's and Navy's current space responsibilities.

¹⁰ AFTAC Public Affairs. "Air Force Technical Applications Center." Sixteenth Air Force (Air Forces Cyber), September 5, 2019. <https://www.16af.af.mil/About-Us/Fact-Sheets/Display/Article/1963049/air-force-technical-applications-center/>.

¹¹ Northrop Grumman. "Minotaur I." Northrop Grumman, 2018. https://www.northropgrumman.com/Capabilities/Minotaur/Documents/MinotaurI_Factsheet.pdf.