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Key Points

For the past 30 years, the U.S. Air Force sized its forces for lesser regional contingencies and struggled to modernize with inadequate budgets. This compelled the service to trade warfighting capacity to maintain current readiness. Today's Air Force is now the smallest, oldest, and least ready for a conflict with a peer adversary in its history.

Over the same timeframe, China modernized its forces to offset the U.S. military's advantages in precision strike, stealth, information networks, and other capabilities. Moreover, China and Russia's acts of aggression make clear they are willing to use military power to achieve their regional hegemonic ambitions.

The Air Force must reset its force design and grow its warfighting capacity. B-21 stealthy bombers provide unmatched survivability, large weapons payloads, very long ranges, and other capabilities integral to this new force design.

The Raider's capabilities cannot be matched by forces operated by any other U.S. service or allied military and are the most cost-effective option to increase the size of the U.S. triad to deter two nuclear peer adversaries, China and Russia.

DOD must acquire sufficient B-21s to field a force of at least 300 bombers and do so at a rate that will grow its deterrence capacity this decade when the threat of peer aggression is most acute. This will require Congress to allocate additional resources to the Air Force to ensure it can acquire B-21s at scale without sacrificing the service's other critically needed modernization programs.

The B-21 Bomber: A Cost-effective Deterrent for a Multi-polar World

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Abstract

The 2014 annexation of Crimea, the invasion of Ukraine, and the threat of an assault on Taiwan demonstrate Russia and China's willingness to use their militaries to achieve their hegemonic ambitions. This is why rapidly defeating peer aggression is now DOD's keystone force sizing and shaping requirement. A major challenge for the Air Force is the fact that its current combat forces cannot meet this requirement at an acceptable degree of risk. This force is a direct result of DOD decisions over the last 30 years to downsize the Air Force's combat aircraft inventories and forgo modernization programs needed to keep pace with emerging threats. The service's fighter inventory is now less than half the size of the force available to respond to Iraqi aggression in 1991, and its bomber inventory is one-third the size of the force that deterred the Soviet Union during the Cold War.

The Air Force is creating a new force design to defeat aggression by a peer adversary, deter nuclear attacks on the United States, and meet its other global operational requirements. This force design will require it to field new capabilities like stealthy B-21s and a Next Generation Air Dominance (NGAD) family of systems. Only B-21s—and 19 B-2s while they remain in the force—will have the survivability, range, and large payloads needed to strike targets at the required scale to defeat peer aggression in the Pacific and then “swing” if needed to deter aggression in another theater. And like B-2s, B-21s are dual capable, which means they are designed to conduct nuclear as well as conventional strikes. This dual capability creates an opportunity to rapidly grow the size of the U.S. triad to deter *two* peer nuclear adversaries—Russia and China—as well as rebuild capacity to respond to conventional threats in multiple theaters as recommended by the Congressional Commission on the National Defense Strategy. This “two for one” approach is a once-in-a-generation opportunity to cost-effectively rebuild DOD's deterrence capacity and credibility at a time when the threat of peer aggression is reaching an unprecedented high.

Introduction

America's ability to deter, and if necessary, prevail, over threats to its vital security interests has greatly eroded since the end of the Cold War. This erosion is the result of a series of decisions over the last 30 years that reduced the U.S. military's size and delayed modernization of its most critical forces, including the conventional and nuclear capabilities of the U.S. Air Force.

According to the *2022 National Defense Strategy*, the Department of Defense's (DOD) highest priorities are to defend the U.S. homeland, deter nuclear attacks, deter and remain prepared to defeat aggression by a peer adversary, and increase the resiliency of its forces.¹ The strategy also reaffirmed DOD's 2018 decision to establish China the pacing threat for sizing its forces and relegate Russia to a lesser, "acute" threat status.²

While DOD's 2018 shift toward planning for great power conflict was timely, it also abandoned its long-standing requirement to size the U.S. military for two major regional conflicts. The Air Force, Space Force, Army, Navy, and Marine Corps are now required to organize, train, and equip their conventional forces to defeat aggression by a single peer adversary and deter—but *not defeat*—a lesser aggressor in another region. DOD's adoption of this one-war force planning policy was motivated more by its desire to avoid the cost of increasing its force capacity than addressing emerging strategic realities. These realities include the continuing proliferation of nuclear weapons and emergence of China as a peer nuclear power.³ DOD continues to size its triad of

nuclear-capable bombers, intercontinental ballistic missiles (ICBMs), and ballistic missile submarines to deter a single nuclear competitor—Russia. Baselineing the U.S. triad on a Cold War-era duopoly that no longer exists is the result of political leadership's desire over the last 30 years to constrain defense spending and reduce reliance on nuclear weapons for deterrence.

Real-world events are now proving the folly of sizing America's conventional and nuclear forces for a single pacing threat. The war in Ukraine and spiraling conflict in the Levant demonstrate the risks created by DOD's attempt to "park" requirements to deter in Europe and the Middle East in favor of shifting its resources toward the Indo-Pacific. The United States must remain ready to counter aggression from multiple regional bad actors and terrorist groups that have obtained guided missiles, drones, and other modern capabilities that allow them to wage asymmetric warfare. At the same time, China is in a nuclear breakout, meaning it is rapidly increasing the size of its nuclear-capable forces with the intent to reach parity with the United States, and Russia has almost completed modernizing its triad.⁴ Moreover, North Korea is developing the ability to launch nuclear strikes at intercontinental ranges, and Iran may soon become the world's next nuclear power. Growing cooperation between these adversaries increases the need for a U.S. triad that has the capabilities and capacity to deter multiple nuclear threats concurrently instead of sequentially and in isolation.⁵

China and Russia took advantage of DOD's decades-long modernization pause after the Cold War to field advanced air defense systems, long-range missiles, anti-satellite weapons, and other counter-intervention capabilities. These will make U.S. military operations in all domains far more challenging than in past conflicts. DOD's

DOD's failure to reset its conventional forces and nuclear triad caused many of its weapon systems to exceed their planned service lives. This calls into question their continued credibility as an effective deterrent in the eyes of America's adversaries. The U.S. military's forces are at risk of losing additional capacity and efficacy if their modernization programs are further delayed.



Figure 1: B-52 taking off from Andersen AFB, Guam.

Source: [U.S. Air Force Photo, DVIDS](#)

failure to reset its conventional forces and nuclear triad over the same time frame caused many of its weapon systems to exceed their planned service lives. This calls into question their continued credibility as an effective deterrent in the eyes of America’s adversaries.⁶ The U.S. military’s forces are at risk of losing additional capacity and efficacy if their modernization programs are further delayed due to insufficient funding or other reasons.

Only the Air Force now has an opportunity to create a force design that has the very long ranges, survivability, weapons payload capacity, and mission flexibility to decisively deter both nuclear and conventional threats in multiple theaters.

DOD rebuild its capacity to deter and defeat “simultaneous aggression in Europe and Asia using conventional forces” and ensure the size and force mix of its nuclear triad “account for

the possibility of combined aggression from Russia and China.”⁸ According to General Anthony Cotton, Commander of the U.S. Strategic Command, the potential for “near-simultaneous conflicts with multiple nuclear-armed, opportunistic adversaries” is now a very real possibility.⁹

Rebuilding a force to deter this unprecedented array of threats will not be without cost. However, there is a **cost-effective** option that would greatly enhance the U.S. military’s multi-theater deterrence credibility: acquire a robust force of nuclear and conventional-capable B-21 bombers. The need to acquire at least 200 dual-capable stealthy B-21s is borne of the need to rebuild an Air Force that has been hollowed out by force cuts. And while similar cuts also affected the U.S. Army and Navy, they were of a lesser magnitude. Moreover, only the Air Force now has an opportunity to create a force design that has the very long ranges, survivability, weapons payload capacity, and mission flexibility to decisively deter both nuclear and conventional threats in multiple theaters.¹⁰

The Hollowing of the U.S. Air Force _____

Today's Air Force is the product of decades of incremental force cuts and delayed or canceled modernization programs.¹¹ The service is marginally prepared to defend America's vital interests due to its decreased readiness, the advanced ages of many of its aircraft, and insufficient budgets that require it to retire aircraft faster than it can buy new.¹² For instance, the Air Force's Fiscal Year 2023 budget request proposed divesting 250 of its older aircraft and buying only 82 new jets.¹³ This long-standing practice, which DOD calls trading current force capacity for future capabilities, has deferred future capabilities for too long and is no longer sustainable.

DOD's post-Cold War force planning policies increased the risk of failure in a peer conflict. The slide toward a hollow Air Force began after Operation Desert Storm in 1991. Following this stunning victory, DOD's civilian leadership believed it was feasible to reduce defense expenditures by cutting forces that would not be required for two Desert Storm-like major regional conflicts. Only three years after the end of the Cold War, President George H.W. Bush announced his decision to acquire only 20 of the 132 dual-capable stealthy B-2 bombers the Air Force required to keep pace with emerging threats. One year later, the Secretary of Defense determined that roughly 40 percent of the Air Force's fighter wing equivalents and 31 percent of its bombers were no longer needed and could be phased out of the force by 1999.¹⁴

DOD leaders levied additional force cuts on the Air Force over the next 20 years, including a decision to cap the service's acquisition of stealthy F-22 air dominance fighters at 187 aircraft—far short of the Air Force's 381 F-22 requirement—partly based on the short-sighted assumption that an adversary would not be capable of challenging U.S. air superiority before the

F-35 was fully fielded. These budget and policy decisions forced the Air Force to break with its Cold War practice of fielding a new combat aircraft approximately every two years to keep pace with emerging threats and technological advances. Since 1989, the service has only had the resources to acquire an average of *one* new fighter or bomber design about every *ten* years.

DOD's post-Cold War force planning and resource policies have proven myopic given the growing threat from Chinese and Russian advanced integrated air defense systems (IADS) and other anti-access/area-denial (A2/AD) systems. Today, the Air Force's small F-22 force cannot generate enough sorties to achieve the degree of air superiority needed to ensure the success of joint force operations in a peer conflict. Overall, the Air Force's fighter inventory is now less than half the size of the force it could call on to fight Operation Desert Storm—from an inventory of approximately 4,300 fighters in 1989 to roughly 2,100 in 2022.¹⁵ And after applying the percentage of total time an aircraft can perform at least one of its assigned combat missions—its mission capable rate—across the fleet, the Air Force has fewer than 1,000 fighters available to support America's combatant commanders. Many of these fighters consist of A-10s with an average age of 41 years and F-16s, F-15C/Ds, and F-15Es that exceed 30 years of service. This force is wholly inadequate to simultaneously defeat peer aggression, defend the United States, and deter—much less defeat—threats in a second theater.

The same is true for the U.S. bomber force. The Air Force operates the free world's only bomber force that can strike dozens of targets per sortie over global ranges, including moving targets at sea. Despite these unique advantages, force cuts and insufficient budgets pushed the Air Force to reduce its bomber inventory by two-thirds

since 1989. After accounting for mission capable rates and subtracting test and training aircraft, today's force of 19 B-2s, 45 B-1Bs, and 76 B-52Hs might generate fewer than 55 combat ready bombers on a day-to-day basis. Operationally, this means only about 15 bombers could be engaging targets in *one* theater at a time while other bombers are enroute to target areas, regenerating at bases for their next sortie, or, in the case of B-52s and B-2s, standing alert in the United States to deter nuclear attacks.

Moreover, all bomber sorties are not equal. Nineteen B-2s are now the U.S. military's *only* combat aircraft that have the range, survivability, payload capacity, and other attributes needed to strike scores of targets deep in highly contested environments.¹⁶ Cold War-era non-stealthy B-52Hs and B-1Bs are limited to launching "stand-off" strikes from areas that cannot be reached by long-range Chinese or Russian air defenses. And unlike "stand-in" strikes conducted by stealthy bombers that can penetrate contested environments, stand-off attacks are less effective against targets that are highly mobile, hardened, or deeply buried.¹⁷ The Air Force's current bomber inventory already falls short of its stated requirement for 225 total aircraft and will remain deficient until operational B-21s are fielded in significant numbers sometime in the 2030s. There are now no excess bombers to compensate for attrition in war or even bombers that are in long-term maintenance status. In fact, the Air Force has indicated its operational bomber force will further decrease this decade as it retires its B-1 and B-2 inventories and cycles B-52s through their maintenance depot for planned upgrades.

The Air Force's chronic inability to recapitalize and modernize means it must continue to operate air superiority, strike, surveillance, and other aircraft that have exceeded their planned design lives despite increasing risks to the force. Continuing to

operate these aging airframes increases the occurrence of safety and reliability issues. Furthermore, these older airframes may not be able to perform to peak expectations. Advanced ages and hard use over the years are why the service must soon retire its F-15C fighters, B-1B bombers, and other aircraft. Worse yet, the diminished capabilities of this aging force cannot be offset by the too-small inventories of B-2 bombers, F-22 air superiority fighters, and multi-mission F-35As. While they remain the best stealthy aircraft in the world, their numbers are insufficient to prevail over a peer adversary plus credibly deter other threats as required by the U.S. National Defense Strategy.

A viable joint force fundamentally depends on the capabilities and capacity afforded by U.S. Air Force combat airpower—anyone questioning this should look at the scenario now playing out in Ukraine. An Air Force with too few modern jets, too few highly trained aircrews, and a force mix that is better suited for lower threat environments of the past *encourages* the kind of aggression the National Defense Strategy seeks to deter. In 2004, then-Secretary of Defense Donald Rumsfeld said, "You go to war with the army you have, not the army you might want or wish to have at a later time."¹⁸ Today, going to war with China with the Air Force we have could result in unsustainable loss rates for *all* U.S. forces—and possibly a defeat that would irrevocably disrupt the international order.

The aging U.S. nuclear triad. The ability to launch retaliatory strikes in response to nuclear aggression has long been the foundation of America's nuclear deterrence strategy. Since the 1960s, a triad of ICBMs, nuclear-capable bombers, and submarines carrying submarine-launched ballistic missiles (SLBM) underpinned this strategy. While each of these three legs of the triad has unique advantages that enhance deterrence, its current systems were designed



Figure 2: B-2 landing at RAAF Base Amberly, Queensland, Australia.

Source: [U.S. Air Force Photo, DVIDS](#)

during the Cold War for a significantly different threat environment than exists today. In some cases, triad systems like the Minuteman III ICBM and Air-Launched Cruise Missile (ALCM) have exceeded their planned service lives and must be replaced as quickly as possible to ensure they remain safe, secure, and credible.

The Air Force has maintained ICBMs on alert status for the last 65 years to give U.S. national command authorities options to respond within minutes of receiving warning of a nuclear attack on the United States. This land leg of the triad now consists of 400 Minuteman III missiles deployed across the Air Force's 450 operational ICBM silos. These silos and their launch control facilities are dispersed over 30,000 square miles in five U.S. northern tier states to make it difficult for an adversary to launch a preemptive nuclear strike with high confidence that it will destroy the U.S. ICBM force. The Air Force modified its Minuteman III missiles to carry a single warhead to comply with the New START Treaty.¹⁹

The three-stage, solid-fuel Minuteman III was designed in the 1960s with a planned service life of ten years. A series of upgrades and service life extensions have sustained

Minuteman III and their infrastructure since then, but the Air Force has hit a hard stop in what it can do to keep this force combat ready. Without a replacement ICBM, the Air Force will not be able to meet its requirement to maintain 400 operationally deployed missiles in the field shortly after 2030. New ICBMs are the only viable option to meet future triad requirements since Minuteman III have been out of production for decades, and many of their components are no longer manufactured.²⁰ Minuteman III modernization is essential and must not be delayed, deferred, or curtailed.

The Air Force also operates the air-breathing leg of the triad, comprising 46 nuclear-capable B-52s and 19 B-2s. Non-stealthy B-52s originally designed in the 1950s are extremely vulnerable to modern IADS and cannot penetrate contested areas with an acceptable degree of risk. The Air Force sought to acquire stealthy B-2s in the 1990s capable of operating in areas covered by increasingly advanced IADS fielded by post-Soviet Russia. B-2s have flying wing shapes that are coated with materials that deflect and absorb radar energy, advanced mission systems to detect and avoid threats, and other capabilities that greatly reduce their potential to be tracked

by active and passive sensors. Both B-52s and B-2s can deliver nuclear “gravity” bombs, and the B-52H can also carry up to 20 subsonic nuclear ALCMs to strike over long ranges without penetrating enemy air defenses. The bomber force is considered the most flexible leg of the triad because it can be placed on alert to signal national resolve in a crisis, dispersed to remote locations to enhance their survivability, or directed to attack any target on the face of the Earth. The U.S. bomber force is also the only leg of the triad that can launch, remain in a survivable airborne alert status, and then either strike or stand down and be recalled.

Like the Minuteman III enterprise, the Air Force must modernize its bomber forces. The Air Force accepted its final B-2 almost 28 years ago, and the youngest of its

remaining B-52s is 62 years old. While the B-2 remains the world’s best operational stealthy bomber, its main drawback is the small size of its inventory—again, only 19 aircraft. Moreover, B-52s rely on ALCMs to strike targets

located in contested areas during a nuclear exchange. The B-52’s current ALCMs are subsonic missiles designed in the 1970s to evade Soviet-era missile defenses at range, not modern Russian and Chinese IADS. ALCMs will soon not be able to penetrate highly contested environments, which means B-52s would have to use very short-range nuclear gravity bombs to attack targets. This weapons-based limitation alone would greatly increase operational risk and reduce the credibility of the bomber leg of the triad.

The U.S. Navy operates the sea-based leg of the triad, which now consists of 14 *Ohio*-class SSBNs. Each SSBN can carry up to 20 Trident II D-5 sea-launched ballistic missiles (SLBMs) with multiple

independent reentry vehicles (MIRV) that can each deliver a nuclear warhead on a separate target. SSBNs are considered the most survivable leg of the triad—when they have sortied from their U.S. ports—and help assure the United States will have a second-strike capability after a nuclear attack. In peacetime, each SSBN averages approximately 77 days at sea interspersed with 35 days at their home ports, excluding boats that are in long-term maintenance status. Like the other two legs of the triad, the Navy designed its *Ohio*-class SSBNs in the 1970s for a planned service life of 30 years, which has since been extended to 42 years. The service lives of earlier model *Ohio*-class SSBNs will begin to expire in 2027.

The U.S. nuclear triad has been a billpayer. The main reason for the U.S. triad’s creeping obsolescence is no secret: DOD used its nuclear enterprise as a “billpayer” for decades after the Cold War. This means that DOD deferred recapitalizing its triad in favor of reducing defense expenditures and sustaining its other forces—a robbing Peter to pay Paul gambit. All three legs must now be modernized—simultaneously—without further delay. The U.S. Government Accountability Office assessed that “as a result of delaying the recapitalization of the nuclear triad repeatedly, there is now little-to-no margin for further delaying U.S. nuclear modernization programs and upgrading of the nuclear weapons infrastructure without harming the nation’s deterrent.”²¹

The good news is the U.S. Congress and DOD now agree the triad must be modernized. In fact, it is one of the most constant bipartisan defense priorities. Multiple presidential administrations—regardless of party—have validated the need to modernize the triad since DOD initiated programs to do so roughly a decade ago. The Air Force

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will soon begin replacing its B-2s with B-21s with the intent to field at least 100 of these advanced stealthy aircraft. To ensure B-52s remain combat credible until at least 2060, they will receive new engines, an active electronically scanned array (AESA) radar, upgraded avionics and communication systems, and new nuclear-capable Long-Range Standoff Weapons (LRSO) that are designed to penetrate contested environments.²² At the same time, the Air Force’s Sentinel program will replace its 1970s-era Minuteman III missiles, silos, launch facilities, and command and control systems. The Navy will recapitalize its leg of the triad beginning in the 2030s with new *Columbia*-class SSBNs.

These programs must proceed on their planned schedules to avoid further degradation to the credibility of the U.S. triad. That said, modernizing the triad without increasing its *capacity* will not create a force capable of deterring two nuclear peer competitors as recommended by the U.S. Strategic Posture Commission. Growing the triad’s capacity requires thoughtful, considered investment, and the most **cost-effective** option currently available is acquiring a larger force of dual-capable B-21 bombers. Compared to ICBMs and SSBNs, only B-21s are a true multi-mission capability that can swing between nuclear and conventional operations to meet U.S. combatant commander requirements. This “two-for-one” dual capability alone makes B-21s the most *cost-effective* means to simultaneously enhance both nuclear and conventional deterrence.

The B-21: A Cost-effective Deterrent for a Multi-Polar World

In January 2024, Dr. William LaPlante, DOD’s Under Secretary of Defense for Acquisition and Sustainment, announced he had approved low-rate production for the B-21 “based on the results of ground and flight tests and the team’s mature plans for manufacturing” the new bomber.²³ One of the most important facts to understand about the B-21 is the Air Force designed it to perform as the lead component of a long-range strike family of systems. This family will likely include uninhabited aircraft equipped with sensors, electromagnetic warfare capabilities, and other mission systems that will, in combination, ensure U.S. warfighters can strike any target over long ranges in a peer conflict.²⁴ The ability to strike targets at scale—potentially 100,000 or more aimpoints—in highly contested environments is a foundational requirement for deterring and defeating Chinese or Russian aggression.²⁵

The B-21 will provide affordable mass to deny a Chinese or Russian *fait accompli*. A *fait accompli* refers to an adversary rapidly overcoming and occupying territory before the U.S. military or its allies can effectively respond, thus presenting an escalation dilemma should outside forces attempt to intervene. Russia and China have made clear their intent and propensity to aggressively seize areas along their peripheries quickly and decisively. Russia’s successful annexation of Crimea in 2014 is an example of this *fait accompli* strategy in action. A successful Chinese *fait accompli* campaign to occupy Taiwan—possibly within days or a couple of weeks—could force the United States and its allies to either accept the new status quo or face mounting a major counteroffensive that could be prohibitively costly.

This is why rapidly denying and then defeating a Chinese or Russian *fait accompli* campaign is the U.S. National Defense Strategy's key force planning challenge. According to Dr. Colin Kahl, DOD's Undersecretary of Defense for Policy in 2021, the U.S. joint force must have the credible capability to deny "the type of rapid *fait accompli* scenarios that we know potential adversaries are contemplating, so they can't make a rapid lunge at our partners and allies before they believe the United States can show up."²⁶ This is a far more stressing requirement for sizing and shaping U.S. forces compared to the Desert Storm-like scenarios DOD transformed its post-Cold War forces to address.

In 2022, Secretary of the Air Force Frank Kendall acknowledged the Air Force was stretched too thin to meet this and other defense strategy requirements with an "aging and costly-to-maintain capital structure with average aircraft ages of approximately 30 years and operational availability rates that are lower than we desire."²⁷ Kendall established seven operational imperatives to address these shortfalls and develop capabilities that "the Department of the Air Force must invest in to protect the United States' ability to deter conflict and project power against pacing challenges."²⁸ Operational imperative number 6 is focused on fielding a family of systems for global strike that would be anchored by stealthy B-21 bombers. This family of systems—including uncrewed collaborative combat aircraft (CCA) equipped with sensors and other capabilities and advanced munitions designed to penetrate IADS—will provide the affordable mass needed to rapidly blunt a Chinese invasion of Taiwan or a Russian invasion in the Baltics.²⁹

The Air Force uses the term "affordable mass" to describe a future force capable of delivering a sufficient density of sensors and

weapons over long ranges to create decisive effects against the most difficult target sets in a peer conflict. This force must be *affordable* in the sense that the Air Force should be able to acquire new long-range strike capabilities at the scale needed to defeat a *fait accompli* campaign with its constrained budget. These capabilities must be able to strike forces that are essential to a peer adversary's offensive campaign, like the PLA's long-range coastal air defenses, surface action groups (SAGs) arrayed around Taiwan to shield China's military operations, and airbases generating PLA fighter sorties. Defeating a Chinese assault on Taiwan or a Russian invasion of one or more of the Baltic states could require allied air forces to strike 100,000 or more aimpoints over long ranges. This is a conservative estimate, considering U.S. air forces alone attacked about 40,000 aimpoints during Operation Desert Storm in 1991 in a much smaller geographic region.³⁰ It will also require stealthy aircraft that can operate in battlespaces that will remain highly contested throughout a *fait accompli* defeat campaign. This is a major departure from conflicts since the Cold War in which U.S. forces were able to quickly establish air and sea dominance to open the way for non-stealthy forces to operate with acceptable risk.

Furthermore, some targets critical to defeating a Chinese or Russian offensive, such as mobile ballistic missile launchers and anti-satellite weapons, could be located deep in their interiors. Only stealthy B-21s—and B-2s while they remain in the force—will have the range, survivability, persistence, and payloads to strike across these immense battlespaces. The need to execute attacks deep into an adversary's interior will be a policy decision, but failing to develop the capability to do so will eliminate this tool. Knowing the United States wields this option could serve as a key means to deter peer aggression and manage escalation.



Figure 3: B-21 test flight above Edwards AFB in April 2024.

Source: [Courtesy Photo, DVIDS](#)

Designed to provide affordable mass.

Affordability is a critical attribute for next-generation capabilities that must be acquired at the scale needed to defeat aggression by a peer adversary. This is why the Air Force adopted a family-of-systems approach to designing the B-21: it would create opportunities to offload some capabilities needed to close kill chains from the new bomber to other crewed and uninhabited aircraft in the family. Distributing functionalities in this way would help reduce the B-21's cost and possibly free some of its on-board capacity for lethal payloads.

Adopting a family-of-systems approach also increases the survivability and lethality of the Air Force's penetrating long-range strike operations. There are obvious advantages to designing the B-21 with all-aspect, broadband stealth, which is a product of its advanced low-observable shape, exterior coatings that absorb radar energy, in-cockpit information fusion, and smart mission planning tools that help pilots avoid high-risk threats. B-21 survivability will be further enhanced by operating them with other

systems in ways that present adversaries with a far more difficult air defense challenge. Instead of concentrating on finding and tracking penetrating B-21s, an adversary will need to characterize an attacking force that could include multiple crewed and uninhabited aircraft, jammers, and other systems that are part of the Air Force's strike packages. This can complicate an adversary's ability to prioritize threats and force it to expend its defenses against decoys and other lower-value systems instead of B-21s.

The Unique Capabilities of B-21s Will Enhance Deterrence

B-21s will further enhance conventional and nuclear deterrence by reducing a peer adversary's ability to use its vast interior as an operational sanctuary to stage its long-range power-projection operations. With its range and stealthy attributes unmatched by any other combat aircraft, B-21s can hold at risk mobile and other high-value targets located deep in a peer adversary's interior. And B-21s can do so, if required, without relying on real-

time cues from off-board command, control, intelligence, surveillance, and reconnaissance (C2ISR) networks that are susceptible to an adversary's countermeasures. No other existing or planned U.S. strike system will provide a similar unilateral capacity to strike dynamic targets at the same scale and tempo in highly contested operational environments.

Eliminating operational “sanctuaries” created by precision strike countermeasures. China and Russia have fielded a wide range of active and passive countermeasures to offset the U.S. precision strike advantage. Passive countermeasures include distributing high-value military capabilities deep in areas covered by advanced IADS and mobilizing ballistic missile launchers that could be targeted. Paired with active defense systems to disrupt C2ISR networks, these measures are designed to break the U.S. ability to find, fix, track, target, and engage targets. The capability to close kill chains against targets that adversaries value most dearly without first establishing domain dominance is essential to maintaining a credible U.S. deterrent. It is also a baseline requirement for the B-21.

When B-21s are fielded at scale, no other precision strike force in the U.S. military will match their ability to penetrate deep into contested areas to strike dozens of high-value mobile targets per sortie. Fighter aircraft carry fewer weapons and typically have a combat mission radius of 650–700 nm or less. This means that, in the best-case scenario, U.S. and allied fighters operating from their Pacific bases would be able to reach targets along parts of China's coastline, but not many hundreds of miles inland. Other strike platforms, like the Navy's aircraft carriers, may have to stand off 1,000–1,500 nm from China to reduce the risk they will be attacked by anti-ship missiles. These distances significantly exceed the combat radius of their embarked fighters and would greatly reduce their potential to strike PLA forces in the Taiwan Strait. Moreover, many carrier fighters would be dedicated to outer air battle operations to defend their carrier battle groups against PLA Air Force bombers carrying long-range anti-ship cruise missiles.



Figure 4: B-21 test flight out of Edwards AFB in January 2024.

Source: [Courtesy Photo, DVIDS](#)

Unmatched ability to penetrate areas covered by advanced IADS. B-21s have stealth technologies that greatly reduce the probability they will be detected and tracked by an adversary's multi-spectral sensor networks. Their low observability is far more advanced than early stealthy aircraft that primarily depended on their shapes (planforms) and radar-absorbing coatings to avoid detection. Most contemporary stealth fighters are designed in ways that optimize their frontal aspect signatures to counter ground and airborne radars operating in a narrow part of the electromagnetic spectrum (EMS). In contrast, the B-21's flying wing shape gives it 360-degree "all aspect" low observability across a much broader part of the EMS. The Raider also benefits from next-generation radar-absorbing materials, more advanced computing power, the ability to automatically fuse information from multiple sensors, and software that optimizes its flight path to avoid threats. According to U.S. Secretary of Defense Lloyd Austin, the combined effect of these design features means "even the most sophisticated air-defense systems will struggle to detect a B-21 in the sky."³¹

Unmatched capacity to engage moving targets at scale. The Air Force's diminished combat forces now lack sufficient capacity to kill large numbers of moving targets at range, which is why Secretary Kendall established engaging ground mobile and moving sea surface targets as one of his operational imperatives.³² U.S. Air Force sources have estimated that up to 90 percent of the targets that must be attacked during a campaign to blunt a peer adversary's *fait accompli* will be mobile.³³ China will rely on its mobile SAGs, amphibious ships, and surface-to-surface missile launchers to assault Taiwan. Similarly, a Russian force invading NATO's eastern frontier would largely consist of mobile artillery, rocket launchers, armored vehicles, and other massed fires

capabilities. These are challenging targets to strike with a high degree of precision since their mobility increases the need for U.S. and allied forces to receive real-time information on thousands of aimpoints.

B-21s will have significant advantages over stand-off weapon launchers against these dynamic targets. The time needed for cruise missiles to fly hundreds of miles after they are launched by surface and airborne stand-off strike platforms—even at hypersonic speeds—creates opportunities for an adversary to detect attacks and relocate likely targets. Unlike non-stealthy aircraft, B-2s and B-21s can avoid detection in defended areas, persist to locate mobile and moving targets, and then attack them with or without off-board target cues. Using penetrating bombers to rapidly concentrate offensive mass to strike moving, mobile, and relocatable targets translates directly to meeting timelines to blunt a Chinese or Russian combined arms assault, which is why B-21s are the centerpiece of the Air Force's global strike operational imperative.

Improve resiliency of U.S. long-range kill chains in highly contested environments. Improving the resiliency of the Air Force's long-range strike kill chains is another priority for its future force design. Maintaining a credible nuclear and conventional deterrence force will depend on the service's ability to complete thousands of kill chains in hundreds of hours. This will require long-range strike forces that can find and engage targets despite Chinese or Russian efforts to disrupt the U.S. military's C2ISR networks. Stand-off conventional and nuclear weapons with datalinks may be able to receive target updates while in flight *if* their supporting networks have the required degree of connectivity. B-21 aircrews, conversely, will be able to update or change their targeting priorities while in flight without support from off-board C2ISR.



Figure 5: B-21 housed at Edwards AFB under an Environmental Protection Shelter.

Source: [Courtesy Photo, DVIDS](#)

The value of using aircrews to determine operational priorities on the fly without relying on remote air battle managers has not diminished in an era of drone warfare. In communications-denied environments, only human aircrews will have the ability to determine if they should launch or withhold a conventional or nuclear strike depending on mission priorities and rules of engagement.

The Bottom Line

The Air Force now lacks enough combat aircraft with long ranges, large payload capacities, and all-aspect, broadband stealth needed to conduct decisive strike operations at scale in highly contested environments. Only the Air Force's B-2s can presently meet these requirements with an acceptable degree of risk, and the operational demand for penetrating bombers in a peer conflict will clearly exceed what can be delivered by these 19 stealthy bombers. The solution to this shortfall is now available—next-generation penetrating B-21 Raiders—if DOD acquires them in sufficient numbers to credibly deter and respond to aggression in multiple theaters.

Final Thoughts: Toward a Multi-Theater Deterrent

Maintaining a military with the capacity to fight wars in two theaters simultaneously was considered critical to U.S. national defense for more than 25 years after the Cold War. This changed in 2018 when DOD abandoned its two-war force requirement in favor of fighting a single conflict with a peer adversary and deterring a second, lesser aggressor such as North Korea or Iran. This shift was based on a belief that DOD could not afford to increase the size of all its services to meet a two theater war requirement.

Rebuilding a two-war U.S. military will require additional investments, but failing to do so will greatly increase the risk and cost of operational failures in future wars. This is why it is important for DOD to prioritize cost-effective capabilities—agnostic of service—that have the greatest potential to deter opportunistic aggressors and reduce the cost of rebuilding a two-war force. The key is understanding that **DOD as a whole should have the capacity to fight two wars; every service does not need to have that capacity.**

Determining the right size and capabilities mix of this force must be informed by the nature of potential major conflicts. Since an operation to defeat Chinese aggression in the Indo-Pacific will be sea, air, space, and cyberspace domain dominant, it should be the pacing threat for sizing the Department of the Navy and Department of the Air Force. And since a major operation to defend NATO against Russian aggression would be ground, air, space, and cyberspace domain dominant, it should be the pacing threat for sizing forces structure for the Department of the Army and Department of the Air Force.

This means that both China and Russia should be pacing threats for sizing the Air Force. This makes sense from an operational perspective: only the Air Force can respond over thousands of miles to go on the offensive in both theaters within hours of the start of conflict. Response timing will be critical, since Russian and Chinese *fait accompli* campaigns may reach their decisive points within days, a timeframe that is well outside the weeks required for many Army and Navy forces to deploy from their U.S. bases and join the fight. Only the Air Force's bombers have the range to launch directly from their U.S. bases to strike over intercontinental ranges within hours and then return to their bases or recover at forward locations to generate additional sorties. Bombers can also rapidly swing between theaters and missions to meet changing operational requirements, including missions designed to deter nuclear attacks. Unlike the other two legs of the triad, the nuclear-capable bomber force provides options to dial up or down the size of the U.S. nuclear deterrent force, again, within hours if necessary. Because of this unmatched mission flexibility, the Air Force's bomber force will be one of DOD's most cost-effective means to deter peer aggression and manage escalation in multiple theaters.

Sizing the U.S. bomber force for a multi-polar world. Sizing the U.S. bomber force for two conventional wars reduces the risk that a second regional crisis will escalate to a conflict with China or Russia—one that could have existential consequences for the United States and its allies and friends. However, DOD should also size its bomber force to deter two nuclear peer adversaries. Nuclear threats now facing the United States exceed the deterrence potential of its current triad. DOD projects that China will “have over 1,000 operational nuclear warheads by 2030,” and Russia never stopped modernizing its nuclear forces after the Cold War.³⁴ Russia also maintains an inventory of at least 2,000 shorter-range nuclear systems that are not limited by the New START Treaty. These are the weapons that Russia would most likely use should it decide to follow through on its threats to launch nuclear strikes against NATO states.

Acquiring at least 200 B-21s would be a major step toward a joint force capable of deterring both Chinese and Russian aggression. The Air Force's Global Strike Command has stated it requires 225 total bombers, including the 76 remaining B-52s, for nuclear deterrence and a single peer conflict.³⁵ While this would be a significant improvement over today's force, multiple independent studies that were not bounded by DOD's budget minimization restrictions have recommended rebuilding an even larger bomber force to hedge against multiple conflicts. One analysis required by the U.S. Congress recommended the Air Force field up to 24 bomber squadrons (383 total bombers) as part of a two-war force.³⁶ Other studies led by independent think tanks and retired Air Force general officers recommended DOD field a similar number of B-21s to meet multi-polar deterrence and warfighting requirements.³⁷

It is worth stressing that while conflict scenarios and operational assumptions underlying these assessments were not uniform, they *all* concluded the Air Force's bomber force should be significantly larger and more capable of operating in highly contested environments than it is today. To place these assessments in context, the bomber inventories they recommended are still smaller than the bomber force the Air Force maintained during the Cold War to deter a single peer adversary.

No Time to Waste

America's bombers provide options for global strike and other missions that no other U.S. military capability can provide. These options will not be available if DOD fails to grow its bomber inventory by acquiring B-21s in quantity over the next decade. The future bomber force must be sized to simultaneously deter and decisively respond to Chinese aggression and a second threat in another theater while deterring nuclear attacks. This force should include at

least 200 penetrating B-21s as the most cost-effective means of quickly increasing the U.S. military's capacity to deter conventional and nuclear threats. Other options to grow the U.S. triad, like expanding the Air Force's ICBM fields or acquiring additional *Columbia*-class submarines sometime in the 2040s, will not enhance nuclear deterrence this decade when the threat of peer aggression is projected to reach a new high. B-21s will be daily fliers that can be tasked to support global operational requirements or placed on nuclear alert in the event of a crisis. No other alternative offers the "two-for-one" advantage or has the same potential to hedge against the uncertainty that spans the spectrum of conflict. As U.S. Senator Mitch McConnell recently asked, "Will we give those who crave our leadership more reason to wonder if it's in decline, or will we invest in the credibility that underpins our entire way of life?"³⁸ This is the key question now facing the United States, and a robust force of B-21 Raiders is part of the answer. 🌐

Endnotes

- 1 U.S. Department of Defense (DOD), *2022 National Defense Strategy of the United States* (Arlington, VA: DOD, October 2022), p. 1.
- 2 In 2021, then-Undersecretary of Defense for Policy Colin Kahl explained that declaring China as a pacing threat means that it is “the only country that can pose a systemic challenge to the United States in the sense of challenging us, economically, technologically, politically and militarily.” Jim Garamone, “[Official Talks DOD Policy Role in Chinese Pacing Threat, Integrated Deterrence.](#)” *DOD News*, June 2, 2021.
- 3 According to DOD, the U.S. nuclear triad remains “the backbone of America’s national security.” “[America’s Nuclear Triad.](#)” Defense.gov.
- 4 According to Russian President Vladimir Putin, the percentage of Russia’s nuclear forces that have been modernized “has been brought to 95 percent and in the naval component almost 100percent.” “[Putin says Russia’s nuclear arsenal is near fully modernized.](#)” *Japan Times*, December 20, 2023.
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- 6 For a description of DOD’s current triad forces, see “[America’s Nuclear Triad.](#)” Defense.gov.
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- 8 Madelyn R. Creedon et al., *America’s Strategic Posture: The Final Report of the Congressional Commission on the Strategic Posture of the United States* (Washington, DC: Congressional Commission on the Strategic Posture of the United States, October 2023), p. viii.
- 9 [Anthony J. Cotton, statement before the United States Senate Committee on Armed Services](#), p. 1.
- 10 For more, see David A. Deptula and Mark A. Gunzinger, *Decades of Air Force Underfunding Threaten America’s Ability to Win* (Arlington, VA: Mitchell Institute for Aerospace Studies, September 2022).
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- 13 John A. Tirpak, “[Divestitures and Purchases: USAF’s 2023 Aircraft Plans.](#)” *Air & Space Forces Magazine*, April 29, 2022.
- 14 The Air Force defined a “fighter wing equivalent” at the time as 72 combat-coded fighter aircraft.
- 15 Deptula and Gunzinger, *Decades of Air Force Underfunding Threaten America’s Ability to Win.*
- 16 This inventory of 19 B-2 bombers does not include the aircraft that was damaged during an emergency landing at Whiteman Air Force Base in late 2022.
- 17 For an analysis of the effectiveness of long-range stand-in and stand-off strike capabilities against different target classes, see Mark Gunzinger, *Long-Range Strike: Resetting the Balance of Stand-in and Stand-off Forces* (Arlington, VA: Mitchell Institute for Aerospace Studies, June 18, 2020).
- 18 “[Troops put Rumsfeld in the hot seat.](#)” *CNN*, December 8, 2004.
- 19 The New START Treaty limits the U.S. and Russian Federation’s deployed intercontinental range nuclear weapons to “700 deployed intercontinental ballistic missiles (ICBMs), deployed submarine-launched ballistic missiles (SLBMs), and deployed heavy bombers equipped for nuclear armaments; 1,550 nuclear warheads on deployed ICBMs, deployed SLBMs, and deployed heavy bombers equipped for nuclear armaments (each such heavy bomber is counted as one warhead toward this limit); ... [and] 800 deployed and non-deployed ICBM launchers, SLBM launchers, and heavy bombers equipped for nuclear armaments.” The United States and Russia have agreed to extend the Treaty to February 4, 2026. In February 2023, Russian President Vladimir Putin announced that Russia would suspend—but not withdraw—from New START. U.S. Department of State, “[New START Treaty.](#)” June 1, 2023.
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- 25 See Mark Gunzinger, *Understanding the B-21 Raider: America's Deterrence Bomber* (Arlington, VA: Mitchell Institute for Aerospace Studies, March 2023).
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- 33 Chris Buckley, "The End of the Kill Chain: The Weapons We Need to Arm the Air Force the Nation Needs," briefing to Weapons Pitch Day Conference, slide 4, July 2022.
- 34 Office of the Secretary of Defense (OSD), *Military and Security Developments Involving the People's Republic of China 2023*, (Arlington, VA: DOD, October 2023), p. viii.
- 35 In 2020, Chief of Staff of the Air Force General David Goldfein testified to Congress that "our assessment—and that's been backed up by independent assessments—that a moderate risk force is 220 bombers of which 145 would be B-21s." Goldfein's comment is from a recording of a U.S. Senate Armed Services Committee hearing: "Posture of the Department of the Air Force," March 3, 2020. Nuclear deterrence is an additive requirement for the Air Force, which means that some of its nuclear-capable bombers may be withheld in the United States and not deployed to fight a conventional conflict.
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