**What’s the name of the Air Force’s replacement for the F-35?**

 **The NGAD**

**That name is the “Next Generation Air Dominance (NGAD)” jet fighter.**

There might be a pilot driven version, but most will be pilotless. Without a pilot, the NGAD will be smaller and extremely maneuverable**.**

One potential schema is to have one manned NGAD accompanied by many more unmanned NGAD.

**Here are the details:**

**NGAD: The Air Force's New $300 Million Fighter Could Be a Game Changer**

 **The NGAD**

**by**[**Harrison Kass**](https://nationalinterest.org/profile/harrison-kass)

**Will NGAD Be Worth It?** While few nations even can develop and field a fifth-generation fighter, the United States is already working on a sixth-generation fighter. Known as the Next Generation Air Dominance (NGAD) program, the [sixth-generation fighter](https://dsm.forecastinternational.com/2023/06/08/briefer-next-generation-air-dominance-ngad-u-s-air-force/) is expected to be technologically advanced – and fiscally prohibitive, leading some to question whether the advanced airframe is worth the sticker price.

Only the US, Russia, and China have successfully fielded a fifth-generation fighter. Only the US and China have fielded a fifth-generation fighter (the US’s F-22 Raptor and F-35 Lightning II; China’s J-20 Mighty Dragon) in meaningful quantity. Fifth-generation technology is still cutting-edge beyond what most nations can develop.

Fifth-generation technology includes stealth, internal weapons bays, advanced avionics, super-cruise, thrust vectoring, data fusion, interconnectivity, and, in the case of the F-35, a situational-awareness-boosting pilot helmet costing $400,000 per unit.

The US was ahead of the curve in developing fifth-generation technology. Feeling the pressure of Soviet aerospace development, the US began working towards the F-22 Raptor in the mid-1980s. By the end of the 1990s, the F-22 was flying, demonstrating clearly that a new era in aviation had arrived.

Now, however, with China and Russia catching up, the US is taking the initiative to again set the curve with fighter tech advancement. The NGAD program commenced in 2014 and is expected to one day replace the F-22 Raptor, despite the fact that the F-22 is still, in many respects, the envy of the aviation world.

**What is a sixth-generation aircraft?**

The exact technology in a sixth-generation fighter has not yet been defined. The class exists only in concept. And in concept, the only defined feature of the sixth-generation fighter is that it will be *more advanced*than the fifth-generation fighter. That’s vague, but what it probably means is that the jet will have advanced digital capabilities, human-systems integration, variable cycle engines, increased range stand-off and BVR weapons. Perhaps even laser weapons.

**The**[**NGAD**](https://aviationweek.com/defense-space/aircraft-propulsion/us-air-force-plans-ngad-award-2024)**specifically is expected to revolve around four technological advancements: propulsion; uncrewed systems; materials; and sensors.**

With respect to propulsion, “the Air Force intends to field these new fighters with advanced adaptive cycle engines that will offer more power, more fuel economy, better heat regulation and power production, and greater loiter times than were possible with earlier engine designs,” journalist Alex Hollings wrote.

With respect to materials, “advances in material science are often among the most secretive elements of stealth aircraft design, as today’s Radar Absorbent materials are rated to absorb as much as 80% of inbound radar waves, but limit fighter performance due to their fragility. Improved RAM could reduce maintenance costs, improve stealth, and allow for greater performance,” Hollings wrote.

And with respect to sensors, “the NGAD program leans further into the F-35’s air combat methodology of detecting and targeting enemy aircraft from greater ranges than ever before, allowing the fighter to engage and destroy enemy jets before they ever even know the fighter was there.”

The [NGAD](https://www.19fortyfive.com/2023/09/will-ngad-be-the-worlds-first-6th-generation-fighter/) will be [built](https://www.airandspaceforces.com/ngad-price-per-tail-will-more-than-double-that-of-f-35/) around a “family of systems.” The families centerpiece system will be a manned aircraft – the successor of the F-22. NGAD’s manned aircraft has been referred to as the Penetrating Counter-Air (PCA). In addition to the PCA, the [NGAD program](https://www.popularmechanics.com/military/aviation/a43978942/air-force-only-building-one-ngad-sixth-generation-fighter-jet/) is expected to also feature an uncrewed element – the collaborate combat aircraft (CCA), also known as the loyal wingman platform.

[NGAD](https://www.sandboxx.us/news/airpower/why-americas-new-ngad-fighter-could-be-a-bargain-even-at-300-million-each/) stems from a 2014 Defense Advanced Research Project Agency (DARPA) study. The DARPA study was designed to explore new concepts in air superiority, which would be relevant in the 2030s. The study eventually evolved into the NGAD program, which aims to field a sixth-generation fighter.

===================From Wikipedia ==============================

**From Wikipedia, the free encyclopedia**

*For the US Navy's own distinct sixth-generation air superiority fighter program, also called Next Generation Air Dominance, see*[*F/A-XX program*](https://en.wikipedia.org/wiki/F/A-XX_program)*.*

|  |  |
| --- | --- |
| **Next Generation Air Dominance (NGAD)** | |
| **General information** | |
| **Project for** | [Air superiority fighter](https://en.wikipedia.org/wiki/Air_superiority_fighter) |
| **Issued by** | [United States Air Force](https://en.wikipedia.org/wiki/United_States_Air_Force) |
| **History** | |
| **Initiated** | 2014 |
| **Variations** | [Next Generation Adaptive Propulsion](https://en.wikipedia.org/wiki/Next_Generation_Adaptive_Propulsion) (NGAP), [F/A-XX program](https://en.wikipedia.org/wiki/F/A-XX_program) (Navy program) |

The **Next Generation Air Dominance** (**NGAD**) is a [United States Air Force](https://en.wikipedia.org/wiki/United_States_Air_Force) (USAF) [sixth-generation](https://en.wikipedia.org/wiki/Sixth-generation_fighter) air superiority initiative with a goal of fielding a "family of systems" that is to succeed the [Lockheed Martin F-22 Raptor](https://en.wikipedia.org/wiki/Lockheed_Martin_F-22_Raptor).[[1]](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_note-1)[[2]](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_note-2) A crewed [fighter aircraft](https://en.wikipedia.org/wiki/Air_superiority_fighter) is the centerpiece program of NGAD and has been referred to as the **Penetrating Counter-Air** (**PCA**) and is to be supported by **uncrewed**[**collaborative combat aircraft**](https://en.wikipedia.org/wiki/Collaborative_combat_aircraft)**(CCA**), or [loyal wingman](https://en.wikipedia.org/wiki/Loyal_wingman) platforms, through manned-unmanned teaming (MUM-T).[[3]](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_note-USAF_biennial_2019_2020-3)

The **NGAD originates from**[**DARPA**](https://en.wikipedia.org/wiki/DARPA)**'s Air Dominance Initiative study in 2014**, and is **expected to field the new fighter aircraft in the 2030s**. While originally pitched as a joint Air Force-Navy program, the two services eventually established separate offices and programs. Despite sharing the same name, the Air Force's NGAD effort is distinct from the Navy's, which has the [F/A-XX](https://en.wikipedia.org/wiki/F/A-XX_program) as its crewed fighter component and would have a similar fielding timeframe.[[4]](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_note-:0-4)

History[[edit](https://en.wikipedia.org/w/index.php?title=Next_Generation_Air_Dominance&action=edit&section=1)]

**The NGAD originated from Defense Advanced Research Project Agency (**[**DARPA**](https://en.wikipedia.org/wiki/DARPA)**) studies initiated in 2014 to explore concepts for air superiority systems of the 2030s for the U.S. Air Force and U.S. Navy.** DARPA had completed its Air Dominance Initiative study in March 2014 and based on the results, the Department of Defense acquisition chief Frank Kendall launched the Aerospace Innovation Initiative (AII) in 2015 to develop [X-plane](https://en.wikipedia.org/wiki/X-plane) prototypes to demonstrate technology for future aircraft.[[5]](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_note-5) In 2016, the USAF followed up the DARPA studies with the Air Superiority 2030 (AS 2030) flight plan, but while the plan stated the need for a family of systems, it was still focused on a specific member of the family called the Penetrating Counter-Air (PCA).[[6]](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_note-6)[[7]](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_note-7) In 2018, AS 2030 evolved into the NGAD and expanded its focus from a single addition towards a suite of capabilities.[[8]](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_note-8)

The NGAD program's overarching aim is to develop key technologies that would provide the Air Force with air dominance. These technologies revolve around several areas such as propulsion, stealth, advanced weapons,[[9]](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_note-usni-9) digital design ([CAD](https://en.wikipedia.org/wiki/CAD)-based engineering),[[10]](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_note-digitalDesign-10)[[11]](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_note-f16s-11) and thermal management of the aircraft signature.[[12]](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_note-crs-12) The program changes [traditional Air Force acquisition](https://en.wikipedia.org/wiki/Military_acquisition)[[13]](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_note-13) by the separation of design, production, and support functions in the development process with a $9 billion budget through 2025.[[14]](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_note-14)[[15]](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_note-15) More frequent industry competitions and [simulations](https://en.wikipedia.org/wiki/Simulation) in the design and manufacturing process are characteristic of the development program.[[16]](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_note-16) NGAD is described as a "family of systems", with a fighter aircraft as the centerpiece, and a number of complementing "manned, unmanned, optionally manned, cyber, electronic" systems, which are likely to be uncrewed [collaborative combat aircraft](https://en.wikipedia.org/wiki/Collaborative_combat_aircraft) to carry extra munitions and perform other missions.[[17]](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_note-multirole-17)[[4]](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_note-:0-4)

**A flock of NGADs.**

In particular, NGAD aims to develop a system that addresses the operation needs of the [Indo-Pacific](https://en.wikipedia.org/wiki/Indo-Pacific) theater of operations, where current USAF fighters lack sufficient range and payload. USAF commanders have noted that there may be two variants of NGAD: one with long range and payload for the Indo-Pacific and one more oriented to the relatively short ranges between possible battle areas in Europe.[[17]](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_note-multirole-17) The fighter is expected to leverage [adaptive cycle engines](https://en.wikipedia.org/wiki/Adaptive_cycle_engine) being developed under the [Adaptive Engine Transition Program](https://en.wikipedia.org/wiki/Adaptive_Versatile_Engine_Technology) (AETP) and Next Generation Adaptive Propulsion (NGAP) program, with flight ready engines expected by 2025.[[18]](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_note-18)

The crewed fighter component of the NGAD was briefly envisioned to follow the rapid development and procurement cycles of the "[Century Series](https://en.wikipedia.org/wiki/Century_Series)" fighter aircraft of the 1950s and 1960s; dubbed "Digital Century Series" by [Assistant Secretary of the Air Force](https://en.wikipedia.org/wiki/Assistant_Secretary_of_the_Air_Force_(Acquisition,_Technology_and_Logistics)) (SAF/AQ) [Will Roper](https://en.wikipedia.org/wiki/Will_Roper), fighter designs would be continually iterated to enable the rapid insertion of new technology and procured in small batches. In September 2020, Roper stated that a full-scale prototype of the NGAD fighter aircraft has been flown.[[19]](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_note-19) In May 2021, [chief of staff of the USAF](https://en.wikipedia.org/wiki/Chief_of_Staff_of_the_United_States_Air_Force) General [Brown](https://en.wikipedia.org/wiki/Charles_Q._Brown_Jr.) stated that the NGAD will start replacing the F-22 once it is operational in sufficient quantity, with the fielding goal in the 2030s.[[20]](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_note-20) The F-22 has also been used to test NGAD technology and some advances are expected to be applied to the F-22 as well.[[21]](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_note-21) Due to the complexity and sophistication of modern aircraft design, however, the "Digital Century Series" concept was eventually abandoned in lieu of a more traditional development and procurement approach. In June 2022, the USAF determined that critical technologies were ready to support the program for Engineering and Manufacturing Development (EMD) and the formal solicitation was announced in May 2023, with the goal of source selection in 2024.[[22]](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_note-22)[[23]](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_note-23)[[24]](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_note-24)

On 27 July 2023, Kathy Warden, CEO and President of Northrop Grumman, confirmed that the company quietly notified the U.S. Air Force that it would not bid as a prime contractor for the program, leaving Boeing and Lockheed Martin as the probable two remaining contenders for the main manned fighter component of the program.[[25]](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_note-25)

Developments[[edit](https://en.wikipedia.org/w/index.php?title=Next_Generation_Air_Dominance&action=edit&section=2)]

In FY2023 budget request, the Air Force allocated a total of $1.66 billion for the NGAD program. Further financial commitments are projected, with an estimated additional expenditure of $11.7 billion earmarked for the years spanning from FY2024 to FY2027. The cost of each plane was not disclosed by [Secretary of the Air Force](https://en.wikipedia.org/wiki/Secretary_of_the_Air_Force) [Frank Kendall](https://en.wikipedia.org/wiki/Frank_Kendall_III), but is expected to be in the "multiple hundreds of millions."[[26]](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_note-26)

**In 2023, the Air Force's force structure planning projects approximately 200 manned NGAD fighters, although this is a notional figure for rough planning assumptions**.[[27]](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_note-27)[[28]](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_note-28)

SMG Consulting shared an infographic on the program, showing dimensions, cost, and combat radius, based on the Lockheed Martin 6th generation fighter artist.impressions.[[29]](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_note-29)[[30]](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_note-30)[[31]](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_note-notNG-31)

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  31. [**^**](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_ref-notNG_31-0) AARON MEHTA and MICHAEL MARROW [(27 Jul 2023) Northrop not competing for NGAD sixth-gen fighter: CEO](https://web.archive.org/web/20230727144602/https:/breakingdefense.com/2023/07/northrop-not-competing-for-ngad-sixth-gen-fighter-ceo/) "Northrop CEO Kathy Warden did not rule out working on the Air Force's NGAD as a secondary partner, and indicated the company is still interested in the Navy's next-gen fighter".

**US Air Force eyes NGAD deliveries by 2030. Can it be done?**

**By**[**Stephen Losey**](https://www.defensenews.com/author/stephen-losey)**, *Defense News*, Sep 27, 2022**

Stephen Losey is the air warfare reporter for Defense News. He previously covered leadership and personnel issues at Air Force Times, and the Pentagon, special operations and air warfare at Military.com. He has traveled to the Middle East to cover U.S. Air Force operations.



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