**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_%28Acquisition%2C_Technology_and_Logistics%29) (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)

References[[edit](https://en.wikipedia.org/w/index.php?title=Next_Generation_Air_Dominance&action=edit&section=4)]

* 1. [**^**](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_ref-1) [*"CSAF: F-22 Not in USAF's Long-Term Plan"*](https://www.airforcemag.com/csaf-f-22-not-in-usafs-long-term-plan/)*. Air Force Magazine. 12 May 2021. Retrieved 26 May 2021.*
	2. [**^**](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_ref-2) [*"The Air Force Is Planning For a Future Without the F-22"*](https://www.defenseone.com/technology/2021/05/air-force-planning-future-without-f-22/174001/)*. Defense One. 12 May 2021. Retrieved 26 May 2021.*
	3. [**^**](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_ref-USAF_biennial_2019_2020_3-0) [*Department of the Air Force Acquisition Biennial Report 2019 + 2020*](https://www.af.mil/Portals/1/documents/2021SAF/04_Apr/FY19_FY20_Dept_of_the_Air_Force_Acquisition_Biennial_Report_final.pdf)*(PDF) (Report). U.S. Air Force. 2021. p. 55.*
	4. ^ [Jump up to:***a***](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_ref-:0_4-0) [***b***](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_ref-:0_4-1) [*Air Force Next-Generation Air Dominance Program: An Introduction*](https://apps.dtic.mil/sti/trecms/pdf/AD1169997.pdf)*(PDF) (Report). Congressional Research Service. 2020. p. 1.*
	5. [**^**](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_ref-5) [*"Kendall Unveils 6th Gen Fighter Strategy"*](https://www.defensenews.com/air/2015/02/01/kendall-unveils-6th-gen-fighter-strategy/)*. Defense News. 1 February 2015.*
	6. [**^**](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_ref-6) *Trimble, Steve (21 September 2020).*[*"The Nearly Decade-long Story That Led To NGAD Flight Demonstrator"*](https://aviationweek.com/special-topics/air-dominance/nearly-decade-long-story-led-ngad-flight-demonstrator)*. Aviation Week.*
	7. [**^**](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_ref-7) [*"Introduction to the Air Force's Next Generation Air Dominance Program"*](https://news.usni.org/2020/10/06/introduction-to-the-air-forces-next-generation-air-dominance-program)*. USNI News. 6 October 2020.*
	8. [**^**](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_ref-8) Albon, Courtney. "Air Force Extends AOA for NGAD, Moves Away from Single Fighter Platform." *Inside the Air Force*, vol. 29, no. 38, Inside Washington Publishers, 2018, pp. 3–4, [JSTOR website](https://www.jstor.org/stable/26506699) Retrieved 10 March 2022.
	9. [**^**](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_ref-usni_9-0) [*"Air Force Next Generation Air Dominance Program: An Introduction"*](https://news.usni.org/2020/10/06/introduction-to-the-air-forces-next-generation-air-dominance-program)*. Congressional Research Service. 5 October 2020.*
	10. [**^**](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_ref-digitalDesign_10-0) [Theresa Hitchens (9 Jul 2021) Digital Design Revolution Key To All Domain Ops: Air & Space Officials Say](https://breakingdefense.com/2021/07/digital-design-revolution-key-to-all-domain-ops-air-space-officials-say/)
	11. [**^**](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_ref-f16s_11-0) [Valerie Insinna (9 Jul 2021) How two F-16s from the US Air Force’s ‘boneyard’ will find a second life as digital models](https://www.defensenews.com/air/2021/07/09/how-two-f-16s-from-the-air-forces-boneyard-will-find-a-second-life-as-the-digital-model-for-the-fleet/)
	12. [**^**](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_ref-crs_12-0) [Jeremiah Gertler (5 Oct 2020) Air Force Next-Generation Air Dominance Program: An Introduction](https://crsreports.congress.gov/product/pdf/IF/IF11659) IF11659
	13. [**^**](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_ref-13) Morgan Dwyer. (8 November 2019). ["The Air Force Digital Century Series: Beyond the Buzzwords"](https://www.csis.org/analysis/air-force-digital-century-series-beyond-buzzwords). CSIS.org. Retrieved 10 March 2022.
	14. [**^**](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_ref-14) Gertler, Jeremiah. (5 October 2020). ["Air Force Next-Generation Air Dominance Program: An Introduction"](https://crsreports.congress.gov/product/pdf/IF/IF11659). Congressional Research Service. Retrieved 10 March 2022.
	15. [**^**](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_ref-15) Harper, Jon. (21 September 2021). ["AFA NEWS: Air Force's NGAD Program 'Progressing Per Plan'"](https://www.nationaldefensemagazine.org/articles/2021/9/21/air-forces-ngad-program-progressing-per-plan). National Defense Magazine. Retrieved 10 March 2022.
	16. [**^**](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_ref-16) Mandy Mayfield. (14 July 2020). "JUST IN: Air Force ‘Digital Century Series’ Acquisition Concept Nearing Milestone". [National Defense Magazine website](https://www.nationaldefensemagazine.org/articles/2020/7/14/air-force-digital-century-series-concept-approaching-new) Retrieved 10 March 2022.
	17. ^ [Jump up to:***a***](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_ref-multirole_17-0) [***b***](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_ref-multirole_17-1) *Tirpak, John (16 June 2021).*[*"Brown: NGAD Will be a Multirole Fighter"*](https://www.airforcemag.com/ngad-multirole-fighter-f-35-block-4/)*. Air Force Magazine.*
	18. [**^**](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_ref-18) *Trimble, Steven (31 July 2020).*[*"Budget Shows Flightworthy Sixth-Generation Fighter Engines"*](https://aviationweek.com/defense-space/budget-policy-operations/budget-shows-flightworthy-sixth-generation-fighter-engines)*. Aviation Week.*
	19. [**^**](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_ref-19) *Insinna, Valerie (15 September 2020).*[*"The US Air Force has built and flown a mysterious full-scale prototype of its future fighter jet"*](https://www.defensenews.com/breaking-news/2020/09/15/the-us-air-force-has-built-and-flown-a-mysterious-full-scale-prototype-of-its-future-fighter-jet/)*. Defense News.*
	20. [**^**](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_ref-20) *Tirpak, John (13 May 2021).*[*"New Force Design: NGAD Needed Soon, F-22 Sunset Begins in 2030"*](https://www.airforcemag.com/new-force-design-ngad-needed-soon-f-22-sunset-begins-in-2030/)*. Air Force Magazine.*
	21. [**^**](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_ref-21) [*"F-22 Being Used To Test Next Generation Air Dominance 'Fighter' Tech"*](https://www.thedrive.com/the-war-zone/f-22-being-used-to-test-next-generation-air-dominance-fighter-tech)*. The War Zone. 25 April 2022.*
	22. [**^**](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_ref-22) *Losey, Stephen (1 June 2022).*[*"The Air Force's next-gen fighter has moved into a critical new phase"*](http://archive.today/2022.12.06-214901/https%3A/www.defensenews.com/air/2022/06/01/the-air-forces-next-gen-fighter-has-moved-into-a-critical-new-phase/)*. Defense News.*
	23. [**^**](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_ref-23) *Tirpak, John (24 June 2022).*[*"Kendall Dispenses With Roper's Quick NGAD Rhythm; System is Too Complex"*](https://web.archive.org/web/20230428003721/https%3A/www.airandspaceforces.com/kendall-dispenses-with-ropers-quick-ngad-rhythm-system-is-too-complex/)*. Air Force Magazine. Archived from*[*the original*](https://www.airandspaceforces.com/kendall-dispenses-with-ropers-quick-ngad-rhythm-system-is-too-complex/)*on 28 April 2023.*
	24. [**^**](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_ref-24) [*"NGAD Deadline: Air Force's next-generation fighter will be selected in 2024"*](https://breakingdefense.com/2023/05/the-air-forces-next-generation-fighter-will-be-selected-in-2024/)*. Breaking Defense. 18 May 2023.*
	25. [**^**](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_ref-25) *Biesecker, Cal (27 July 2023).*[*"Northrop Grumman Powers On B-21; Won't Bid On NGAD"*](https://www.defensedaily.com/northrop-grumman-powers-on-b-21-wont-bid-on-ngad/business-financial/)*. Defense Daily.*
	26. [**^**](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_ref-26) [*Air Force Next-Generation Air Dominance Program*](https://sgp.fas.org/crs/weapons/IF11659.pdf)*(PDF) (Report). Congressional Research Service. 2022. p. 1-2.*
	27. [**^**](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_ref-27) *Losey, Stephen (28 April 2022).*[*"Future NGAD fighter jets could cost 'hundreds of millions' apiece"*](https://www.defensenews.com/air/2022/04/28/future-ngad-fighter-jets-could-cost-hundreds-of-millions-apiece/)*. Defense News. Retrieved 12 January 2023.*
	28. [**^**](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_ref-28) *Tirpak, John (7 March 2023).*[*"Kendall Reveals New Details on Air Force Plans: 1,000 CCAs, 200 NGAD Fighters"*](https://www.airandspaceforces.com/kendall-new-details-air-force-plans-200-ngad-1000-ccas/)*. Air and Space Forces Magazine. Retrieved 7 March 2023.*
	29. [**^**](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_ref-29) [[1]](https://img1.wsimg.com/blobby/go/5a828e9a-3204-4b4f-9268-4216d9b5b32a/downloads/NGAD%2BOverview.pdf?ver=1673457351511) Next Generation Air Dominance - SMG Consulting
	30. [**^**](https://en.wikipedia.org/wiki/Next_Generation_Air_Dominance#cite_ref-30) [*"New Next Generation Air Dominance 'Fighter' Renderings From Lockheed"*](https://web.archive.org/web/20230427202238mp_/https%3A/www.thedrive.com/the-war-zone/new-next-generation-air-dominance-fighter-renderings-from-lockheed)*. Retrieved 22 August 2022.*
	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%3A/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.



**This rendering of a Next Generation Air Dominance aircraft, by Lockheed Martin, shows a tailless stealthy future fighter. (Lockheed Martin)**

*Editor’s note: This story was updated with information on the Office of Inspector General’s evaluation of the program.*

NATIONAL HARBOR, Md. — The U.S. Air Force’s secretive, next-generation fighter platform is still in the design process and has not formally [entered its engineering, manufacturing and development stage](https://www.defensenews.com/air/2022/06/01/the-air-forces-next-gen-fighter-has-moved-into-a-critical-new-phase/), the service’s secretary said this month.

The acknowledgment marks a step back from June, when Frank Kendall publicly said the highly classified [Next Generation Air Dominance program](https://www.defensenews.com/air/2022/04/28/future-ngad-fighter-jets-could-cost-hundreds-of-millions-apiece/) had already hit the key milestone. “We have now started on the EMD program to do the development aircraft that we’re going to take into production,” he said during a Heritage Foundation event at the time.

It also has some experts wondering if the service can meet its goal of delivering the first iterations of the sixth-generation fighter by the end of this decade.

Kendall offered the fullest update so far on the status of NGAD during a Sept. 19 roundtable with reporters at the Air and Space Forces Association’s Air, Space and Cyber conference.

The service is still designing NGAD, Kendall said, and the program has not yet gone through the Milestone B review process. That milestone marks the completion of a program’s technology maturation phase and the formal start of an acquisition program, when the service takes its preliminary design and focuses on system integration, manufacturing processes and other details ahead of production.

Kendall’s June comments, in which he also saidthe Air Force would deliver some NGAD capabilities by the end of the decade, surprised some in the aviation world and suggested the program was further along in the process than initially thought. Several defense publications, including Defense News, reported on his comments at the time as indicating NGAD had formally entered the EMD phase.

Asked about his June comments during the Defense News Conference on Sept. 7, Kendall suggested he hadn’t meant the implication.

“I’m an old-school guy,” Kendall said. “I’ve been around doing this stuff for a long time, and I still think of engineering and manufacturing development as a phase in which you are working on the new design.”

Asked again about the program at the Air, Space and Cyber conference, Kendall clarified that the service is still working on NGAD’s design and that he used the term EMD in “my colloquial sense.” He said the Milestone B decision, which occurs after the preliminary design review and is a prerequisite for entering the EMD phase, has not taken place.

Kendall also said the Air Force is still aiming for production of NGAD around the end of the decade.

Air Force acquisition chief Andrew Hunter said this month that the end of this decade is the service’s goal for “fielding the manned platform” component of NGAD. Its drone wingmen, which the Air Force now refers to as [collaborative combat aircraft](https://www.defensenews.com/air/2022/09/07/mark-your-calendar-for-a-planned-drone-wingmen-competition-in-2024/), are expected to arrive sooner, he added.

Kendall’s acknowledgment that NGAD has not entered the EMD phase, much less finished the design process, raises the possibility the program might not reach initial operating capability by the end of the decade, Heritage Foundation think tank fellow and former Air Force fighter pilot John Venable told Defense News.

“It could happen [by 2030], but the odds are against it happening” by then, he said.

Heather Penney, a former F-16 pilot and senior resident fellow at the Mitchell Institute for Aerospace Studies, is also wary the Air Force can achieve its goal by the end of the decade.

“I have serious skepticism that NGAD will reach a meaningful full-rate production Milestone C decision by the end of the decade,” Penney said. “It would be realistic to expect that full-rate production will not occur until sometime into the 2030s. I would love for the Air Force to prove this wrong.”

The Milestone C decision comes at the end of the EMD phase of the acquisition process, and it is where a decision is made whether or not to move a program into the production and deployment phase.

Kendall’s comments have also attracted the attention of the Pentagon’s inspector general.

In a [Sept. 26 letter](https://media.defense.gov/2022/Sep/26/2003085183/-1/-1/1/D2022-DEV0SR-0176.000_REDACTED.PDF) to Heidi Shyu, the undersecretary of defense for research and engineering, the Office of Inspector General said it plans to begin an evaluation of NGAD this month. The office wants to see to what extent the Air Force had demonstrated the program’s critical technologies were mature enough to warrant moving to the EMD phase.

During his June comments, Kendall said the average Air Force acquisition program takes a little less than seven years to move from starting the EMD phase to initial operating capability. Later, at the Air, Space and Cyber conference, he suggested NGAD might be able to compress that timeline. “I’m not sure NGAD will be an average program,” he told reporters.

Kendall has said he is pushing Air Force acquisition officials to get new capabilities, such as NGAD’s autonomous drone wingmen, into the field faster than the process normally allows. For example, Kendall said he isn’t interested in conducting demonstrations or experiments unless absolutely necessary.

“If we don’t need it to reduce risk, we should go right to development for production and get there as quickly as we can,” he said in June. “If the risk is high, and we need to do some things just to be prudent, to address that risk first, we should do that in a focused, efficient way. I have a sense of urgency about getting new capabilities [and] I’m willing to take some risk there.”

While Venable and Penney cautioned there’s a lack of public information on NGAD, they said the program still has multiple headwinds.

The Air Force wants it to have an autonomous drone wingman capability, include sixth-generation technology and exist as a “family of systems” rather than just a single manned aircraft. It will also be expensive, costing hundreds of millions of dollars apiece, Kendall told lawmakers earlier this year.

Because the program hasn’t entered the EMD phase, passed the Milestone B review or finished its design, Venable said the Air Force will have to significantly compress its seven-year timeline to meet the 2030 goal.

“You could call me a skeptic, [but] there is no track record that says they can do that,” Venable said. “If you’re going to buy all commercial off-the-shelf stuff, [that can be done]. This is one where it’s leading-edge technology.”

He and Penney agreed the Air Force might not reach initial operating capability for NGAD until well into the 2030s.

“This is clearly going to be an advanced capability,” Penney said. “Because of the classification, there’s a lot that we don’t know about it — everything from design materials to production to capabilities.”

It’s also uncertain how the different capabilities comprising the “family of systems” will combine to make up the NGAD platform, Penney said — and this will require considerable testing.

“It’s probably not just one airplane; it’s probably several,” Penney said. “And we’ll need to prove that NGAD can connect and communicate with other capabilities, whether or not those are within other domains, or whether or not it’s within its own formation.”

With the Air Force moving to retire older airframes, such as noncombat-capable F-22 jets, and [shift some of the savings to NGAD](https://www.defensenews.com/air/2022/03/28/air-force-would-cut-150-aircraft-including-a-10s-buy-fewer-f-35s-in-2023-budget/), Venable is worried the service may be making a risky bet that NGAD arrives by the end of the decade.

“If it does not happen, and this slides into the next decade — which is more likely than not — it would be a fool’s errand to actually cash in viable combat platforms now on the bet that no Las Vegas gambler would take,” Venable said.

Although Kendall would not discuss NGAD’s capabilities, he remains adamant the program is vital for the Air Force to keep up with advanced competitors, particularly China.

Asked at the Defense News Conference if the nation can afford an air platform costing multiple hundreds of millions of dollars apiece — several times the price tag of an F-35 fighter — Kendall responded: “Can the nation afford not to have air superiority? We have to have air superiority.

Air Force Next-Generation Air Dominance Program https://crsreports.congress.gov | IF11659 · VERSION 2 · UPDATED Disclaimer This document was prepared by the Congressional Research Service (CRS). CRS serves as nonpartisan shared staff to congressional committees and Members of Congress. It operates solely at the behest of and under the direction of Congress. Information in a CRS Report should not be relied upon for purposes other than public understanding of information that has been provided by CRS to Members of Congress in connection with CRS’s institutional role. CRS Reports, as a work of the United States Government, are not subject to copyright protection in the United States. Any CRS Report may be reproduced and distributed in its entirety without permission from CRS. However, as a CRS Report may include copyrighted images or material from a third party, you may need to obtain the permission of the copyright holder if you wish to copy or otherwise use copyrighted material.

============================================================

**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.



**This rendering of a Next Generation Air Dominance aircraft, by Lockheed Martin, shows a tailless stealthy future fighter. (Lockheed Martin)**

*Editor’s note: This story was updated with information on the Office of Inspector General’s evaluation of the program.*

NATIONAL HARBOR, Md. — The U.S. Air Force’s secretive, next-generation fighter platform is still in the design process and has not formally [entered its engineering, manufacturing and development stage](https://www.defensenews.com/air/2022/06/01/the-air-forces-next-gen-fighter-has-moved-into-a-critical-new-phase/), the service’s secretary said this month.

The acknowledgment marks a step back from June, when Frank Kendall publicly said the highly classified [Next Generation Air Dominance program](https://www.defensenews.com/air/2022/04/28/future-ngad-fighter-jets-could-cost-hundreds-of-millions-apiece/) had already hit the key milestone. “We have now started on the EMD program to do the development aircraft that we’re going to take into production,” he said during a Heritage Foundation event at the time.

It also has some experts wondering if the service can meet its goal of delivering the first iterations of the sixth-generation fighter by the end of this decade.

Kendall offered the fullest update so far on the status of NGAD during a Sept. 19 roundtable with reporters at the Air and Space Forces Association’s Air, Space and Cyber conference.

The service is still designing NGAD, Kendall said, and the program has not yet gone through the Milestone B review process. That milestone marks the completion of a program’s technology maturation phase and the formal start of an acquisition program, when the service takes its preliminary design and focuses on system integration, manufacturing processes and other details ahead of production.

Kendall’s June comments, in which he also saidthe Air Force would deliver some NGAD capabilities by the end of the decade, surprised some in the aviation world and suggested the program was further along in the process than initially thought. Several defense publications, including Defense News, reported on his comments at the time as indicating NGAD had formally entered the EMD phase.

Asked about his June comments during the Defense News Conference on Sept. 7, Kendall suggested he hadn’t meant the implication.

“I’m an old-school guy,” Kendall said. “I’ve been around doing this stuff for a long time, and I still think of engineering and manufacturing development as a phase in which you are working on the new design.”

Asked again about the program at the Air, Space and Cyber conference, Kendall clarified that the service is still working on NGAD’s design and that he used the term EMD in “my colloquial sense.” He said the Milestone B decision, which occurs after the preliminary design review and is a prerequisite for entering the EMD phase, has not taken place.

Kendall also said the Air Force is still aiming for production of NGAD around the end of the decade.

Air Force acquisition chief Andrew Hunter said this month that the end of this decade is the service’s goal for “fielding the manned platform” component of NGAD. Its drone wingmen, which the Air Force now refers to as [collaborative combat aircraft](https://www.defensenews.com/air/2022/09/07/mark-your-calendar-for-a-planned-drone-wingmen-competition-in-2024/), are expected to arrive sooner, he added.

Kendall’s acknowledgment that NGAD has not entered the EMD phase, much less finished the design process, raises the possibility the program might not reach initial operating capability by the end of the decade, Heritage Foundation think tank fellow and former Air Force fighter pilot John Venable told Defense News.

“It could happen [by 2030], but the odds are against it happening” by then, he said.

Heather Penney, a former F-16 pilot and senior resident fellow at the Mitchell Institute for Aerospace Studies, is also wary the Air Force can achieve its goal by the end of the decade.

“I have serious skepticism that NGAD will reach a meaningful full-rate production Milestone C decision by the end of the decade,” Penney said. “It would be realistic to expect that full-rate production will not occur until sometime into the 2030s. I would love for the Air Force to prove this wrong.”

The Milestone C decision comes at the end of the EMD phase of the acquisition process, and it is where a decision is made whether or not to move a program into the production and deployment phase.

Kendall’s comments have also attracted the attention of the Pentagon’s inspector general.

In a [Sept. 26 letter](https://media.defense.gov/2022/Sep/26/2003085183/-1/-1/1/D2022-DEV0SR-0176.000_REDACTED.PDF) to Heidi Shyu, the undersecretary of defense for research and engineering, the Office of Inspector General said it plans to begin an evaluation of NGAD this month. The office wants to see to what extent the Air Force had demonstrated the program’s critical technologies were mature enough to warrant moving to the EMD phase.

During his June comments, Kendall said the average Air Force acquisition program takes a little less than seven years to move from starting the EMD phase to initial operating capability. Later, at the Air, Space and Cyber conference, he suggested NGAD might be able to compress that timeline. “I’m not sure NGAD will be an average program,” he told reporters.

Kendall has said he is pushing Air Force acquisition officials to get new capabilities, such as NGAD’s autonomous drone wingmen, into the field faster than the process normally allows. For example, Kendall said he isn’t interested in conducting demonstrations or experiments unless absolutely necessary.

“If we don’t need it to reduce risk, we should go right to development for production and get there as quickly as we can,” he said in June. “If the risk is high, and we need to do some things just to be prudent, to address that risk first, we should do that in a focused, efficient way. I have a sense of urgency about getting new capabilities [and] I’m willing to take some risk there.”

While Venable and Penney cautioned there’s a lack of public information on NGAD, they said the program still has multiple headwinds.

The Air Force wants it to have an autonomous drone wingman capability, include sixth-generation technology and exist as a “family of systems” rather than just a single manned aircraft. It will also be expensive, costing hundreds of millions of dollars apiece, Kendall told lawmakers earlier this year.

Because the program hasn’t entered the EMD phase, passed the Milestone B review or finished its design, Venable said the Air Force will have to significantly compress its seven-year timeline to meet the 2030 goal.

“You could call me a skeptic, [but] there is no track record that says they can do that,” Venable said. “If you’re going to buy all commercial off-the-shelf stuff, [that can be done]. This is one where it’s leading-edge technology.”

He and Penney agreed the Air Force might not reach initial operating capability for NGAD until well into the 2030s.

“This is clearly going to be an advanced capability,” Penney said. “Because of the classification, there’s a lot that we don’t know about it — everything from design materials to production to capabilities.”

It’s also uncertain how the different capabilities comprising the “family of systems” will combine to make up the NGAD platform, Penney said — and this will require considerable testing.

“It’s probably not just one airplane; it’s probably several,” Penney said. “And we’ll need to prove that NGAD can connect and communicate with other capabilities, whether or not those are within other domains, or whether or not it’s within its own formation.”

With the Air Force moving to retire older airframes, such as noncombat-capable F-22 jets, and [shift some of the savings to NGAD](https://www.defensenews.com/air/2022/03/28/air-force-would-cut-150-aircraft-including-a-10s-buy-fewer-f-35s-in-2023-budget/), Venable is worried the service may be making a risky bet that NGAD arrives by the end of the decade.

“If it does not happen, and this slides into the next decade — which is more likely than not — it would be a fool’s errand to actually cash in viable combat platforms now on the bet that no Las Vegas gambler would take,” Venable said.

Although Kendall would not discuss NGAD’s capabilities, he remains adamant the program is vital for the Air Force to keep up with advanced competitors, particularly China.

Asked at the Defense News Conference if the nation can afford an air platform costing multiple hundreds of millions of dollars apiece — several times the price tag of an F-35 fighter — Kendall responded: “Can the nation afford not to have air superiority? We have to have air superiority.

Air Force Next-Generation Air Dominance Program https://crsreports.congress.gov | IF11659 · VERSION 2 · UPDATED Disclaimer This document was prepared by the Congressional Research Service (CRS). CRS serves as nonpartisan shared staff to congressional committees and Members of Congress. It operates solely at the behest of and under the direction of Congress. Information in a CRS Report should not be relied upon for purposes other than public understanding of information that has been provided by CRS to Members of Congress in connection with CRS’s institutional role. CRS Reports, as a work of the United States Government, are not subject to copyright protection in the United States. Any CRS Report may be reproduced and distributed in its entirety without permission from CRS. However, as a CRS Report may include copyrighted images or material from a third party, you may need to obtain the permission of the copyright holder if you wish to copy or otherwise use copyrighted material.