

The U.S. Should Transfer Advanced Jet Engine Technology to India to Support a Strong Partner in Countering China

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KEY TAKEAWAYS

America builds the world's most powerful, reliable fighter jet engines; protecting that advantage is in the U.S. national interest.

It is also in America's interest to strengthen defense ties with India, a key member of the Quad grouping, amid growing concerns about China in both countries.

The U.S. should approve a technology transfer to India while mitigating associated risks and pursuing new forms of defense cooperation with New Delhi.

The Biden Administration recently announced that it would review a request by the Indian government to transfer technology from one of America's most advanced fighter engines—General Electric's F414—to India. The deal would bolster India's capacity to field indigenously produced fighters with some of the most powerful and reliable engines in the class, saving decades of research and development costs. The agreement would also strengthen the growing strategic partnership between India and the U.S. Any advanced technology transfer carries inherent risks, even with reliable strategic partners. However, assuming that those risks can be sufficiently mitigated, and that India is also invested in taking the relationship to new levels, the U.S. government should approve the transfer of the F414 engine technology to India.

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The United States builds the best jet engines in the world. Manufacturers, such as Pratt & Whitney and General Electric, produce incredibly efficient engines for commercial and military aircraft. Their power and reliability remain a step ahead of engines produced by any other nation. Historically, the U.S. government has only offered its engine technology to its most trusted allies, rightly viewing it as among the country's most valuable and sensitive state secrets.

The F414 engine is already being integrated into aircraft being built in South Korea, Sweden, and Türkiye,¹ although South Korea is the only other nation currently assembling or co-producing this engine with the U.S.² The U.S.–Indian defense relationship has accelerated rapidly in recent years, both in scope and depth. Successive U.S. governments of both parties have identified India as a major defense partner, a pillar of the Quad grouping (Australia, India, Japan, and the U.S.), and as a cornerstone of America's Indo–Pacific strategy.

Nevertheless, the risks associated with sensitive technology transfer can only be mitigated, never completely eliminated, and must be adequately addressed in any new agreement with India.

Risks and Considerations

Intellectual property laws matter little to America's geopolitical rivals. In the mid-1940s, the Soviet Union purchased Rolls Royce jet engines from a financially struggling United Kingdom and then cloned them to power their first operational jet fighter, the MiG-15.³ That aircraft–engine pairing was a match for America's best fighters at the time, and MiG-15 pilots shot down a sizable number of U.S. fighter, bomber, and attack aircraft during the Korean War.⁴

Additional Soviet engines were built on the foundation that Rolls Royce naively provided,⁵ and the generations of aircraft engines that followed have proven formidable enough that Russian fighter aircraft are now a staple of air forces across the world, including China's and India's. It was not long before Beijing followed the Soviet lead and began cloning its own jet engines from Russian models.

However, pilfering the technology of others is no substitute for the decades of research development, test, and evaluation (RDT&E) required to match Western technology. Over the past seven years, the U.S. Air Force has invested more than \$4.2 billion to develop a next-generation motor through the Adaptive Engine Technology Program (AETP). The AETP's revolutionary technology is proven to significantly increase the thrust, fuel

efficiency, electrical power generation, and cooling capacity for engine components and, if fielded, would put the U.S. several (more) decades ahead of its nearest engine-producing rival.

Yet, the Air Force has chosen not to field that engine, which means that the AETP's revolutionary technology, which powers the F-18 Super Hornet, is still among the most advanced operational fighter engines in the world. China and Russia would love to get their hands on the technology to replicate the design, engineering, and manufacturing processes and field that technology into their own fleets.

Fighter jet engines are highly complex. The design and manufacturing processes associated with everything from the housing to the individual turbine blades have been refined through decades of development and the generations of engines that preceded the F414.

Any technology transfer carries associated risks of falling into the wrong hands or being reverse engineered by an adversary. This is precisely why the U.S. has been reluctant to share jet engine technology with any but its most trusted treaty allies. General Electric has expressed confidence in its safeguards, though the more advanced the technology being transferred, the greater the risk.⁶ Methods for mitigating that risk include withholding the most technologically advanced elements, such as ceramic composite materials,⁷ and replacing them with previous generational elements.

So why is this advanced fighter engine technology being considered for India now? After all, the U.S. also has the option of selling India the engines without transferring the technology and putting sensitive intellectual property at risk.

First, the deal would build on existing defense cooperation with India, generally, and jet engines, specifically, and India has a good track record of reliability and security. Second, it serves America's geopolitical interests and its Indo-Pacific strategy to continue strengthening ties with India, enhancing India's military capabilities and the defense-related linkages between India and the U.S.

Building on Existing Defense and Jet Engine Cooperation

In 2010, India bought 99 F414 engines from the U.S. for \$650 million, with an option to add 49 more, and it has already received a handful of off-the-shelf engines for prototype testing. Under the terms of the agreement, a portion of those engines would be manufactured in India⁸ and roughly 50 percent of the technology required to build it has already been approved for transfer. The engines will power India's Tejas Light Combat Aircraft Mk II,

a fighter that has faced repeated production delays. The Indian Air Force is targeting 2028 for Tejas Mk II induction⁹ and GE is now estimating engine delivery in 2026.¹⁰

The new arrangement being considered by the Biden Administration would bolster the original deal and involve transferring even more technology to enhance Indian manufacturing of the engine.

The U.S. government's process for evaluating critical technology risk and risk mitigation is controlled by the Department of Commerce through its International Traffic in Arms Regulations (ITAR).¹¹ Once the ITAR package for the F414 engine has been completed, it will be reviewed by the Departments of Commerce, State, and Defense and each will have to give its approval before any additional transfer can take place.¹²

Geopolitical Considerations

India has been an important geopolitical partner for the U.S. and is an emerging great power. India is now the world's most populous country with the third-largest defense budget, following only the U.S. and China.

After virtually no defense relationship with the U.S. in the 20th century, India has purchased more than \$20 billion in arms from the U.S. since 2008.¹³ In 2013, India became the first country to purchase and field the advanced Boeing P8 surveillance aircraft, ahead even of U.S. treaty allies.¹⁴ In recent years, India and the U.S. have also signed several foundational military agreements that, among other things, allow the two countries to share encrypted communications and refuel each other's ships at sea.

Nevertheless, the transfer of jet engine technology to India would mark a substantial upgrade in the level of technology that America is willing to provide to New Delhi. The move carries benefits that could at least partially offset the risks associated with the transfer.

The U.S. government has repeatedly affirmed that India is a pillar¹⁵ of the Quad grouping,¹⁶ which remains central to America's Indo-Pacific strategy. Perhaps more important, the U.S. government has repeatedly affirmed that it is inherently in America's national interest for India to emerge as a strong, sovereign, net provider of security in the Indian Ocean as it contends with a rising China, which still claims more than 90,000 square kilometers of Indian territory. In recent years, the Chinese-Indian border dispute has entered a volatile new stage, with violent clashes in 2020 producing the first casualties from border hostilities in 45 years.

The F414 engine technology transfer would expand on the already growing interoperability between U.S. and Indian military systems. India is

already operating U.S.-made MQ-9B SeaGuardian drones and P-8I maritime patrol aircraft,¹⁷ allowing the seamless sharing of information. Furthermore, the transfer will address New Delhi's long-standing request for jet engine technology, enhancing India's defense industrial base and the development of a highly skilled workforce. It would also improve perceptions of the U.S. as a reliable supplier of choice for advanced defense technology.

Partly because the U.S. cut off arms sales to India during the Cold War, favoring Indian rival Pakistan, New Delhi has had a long-standing defense relationship with Moscow, with Russian platforms comprising a majority of legacy Indian military hardware. New Delhi is currently accepting delivery of a \$5 billion arms package that includes the purchase of five Russian S-400 air defense systems.¹⁸ India also operated Russian-leased nuclear submarines and Russian-origin aircraft carriers.

Expanding the type and sophistication of the arms the U.S. is willing to sell to India may elevate the U.S. as an alternative to India's traditional dependence on Russian hardware, particularly amid rising concerns about Russia's strategic embrace of China, and growing questions about the quality, reliability, and capacity of a Russian defense industrial base increasingly strained by the Ukraine conflict.

Indeed, in 2022 India announced that it will ground its entire fleet of Soviet-era MiG-21s by 2025 following a wave of fatal mishaps resulting from mechanical failures.¹⁹ New Delhi also recently scrapped a long-pending deal for Russian Mi-17 helicopters and "deferred" the acquisition of more MiG-29 and Sukhoi-30MKI Russian fighters.²⁰

India's close and long-standing defense relationship with Russia nevertheless increases risks associated with technology transfer. As a measure of that relationship, India has repeatedly abstained from voting in the United Nations to condemn Russia's invasion of Ukraine.²¹ However, those risks must be balanced by India's relatively strong track record on nuclear safety and nonproliferation.

More important, over the past two decades of defense and intelligence cooperation, India has demonstrated a level of professionalism and reliability. That is evident by the fact the U.S. has felt confident enough to transfer to India advanced surveillance aircraft, transport aircraft, artillery, attack helicopters, and drones. It has shared with India sensitive real-time satellite imagery, and the two sides are able to exchange, and communicate over, advanced encryption equipment. India and the U.S. are also collaborating on aircraft carrier technology and aspiring to co-develop and co-produce a new generation of drones.

Leaps of Faith

Fighter engine deals are commercial transactions, not gifts, and U.S. defense firms have benefitted from billions of dollars in arms sales to India. Nevertheless, the transfer of particularly sensitive technology, such as jet engines, is as much a geopolitical decision as it is a commercial decision.

It would represent a statement of U.S. trust in India and intent for the future of the relationship. The fact that only now, nearly 20 years after signing the first major defense partnership agreement in 2005, is the U.S. considering such a technology transfer, demonstrates the sensitivity of the technology involved.

Supporters of the deal, and of Indian–U.S. relations more broadly, must be prepared to articulate how America benefits from such an arrangement. The U.S. government has repeatedly stated that its relationship with India is not merely transactional and that the U.S. government should not tie approval to any explicit quid pro quo. Nevertheless, if the U.S. is expected to take a leap of faith in India, New Delhi should be receptive to creatively expanding defense cooperation in other arenas.

Which form that expanded defense cooperation might take is an open question. One possibility is greater Indian–U.S. cooperation on the Andaman and Nicobar Islands. The islands hold great geostrategic significance stretching north to south as a gateway to the Strait of Malacca, which connects the Indian Ocean to the South China Sea and Western Pacific.

Under Prime Minister Narendra Modi, India has made a concerted effort to develop the long-neglected islands as a more substantial naval and military hub in the eastern Indian Ocean. Yet, just as America has long been reluctant to share jet engine technology with non-treaty allies, India has long resisted allowing outside powers access to the islands. That is beginning to change: In 2020, India allowed U.S. military aircraft to refuel at a military base in the Andamans for the first time.

The two countries can do much more in the eastern Indian Ocean to enhance their own security and advance their shared vision for a “free and open Indo–Pacific.” A Joint Maritime Domain Awareness Center in the islands could help to track the growing number of Chinese naval assets operating in the Indian Ocean. The islands could also host a new annual Indian–U.S. combined air and naval exercise focused on anti-submarine warfare. Such initiatives would help to strengthen the logic for taking India–U.S. defense ties to new heights in the eyes of any skeptical lawmakers.

What the Biden Administration Should Do

The U.S. will increasingly rely on India and the Quad coalition to keep a check on China's ever-expanding military capabilities and aggressive activities in the Indo-Pacific. With this firmly in mind, the Biden Administration should:

- **Direct** the departments and agencies involved in the ITAR process for the F414 technology transfer to expedite their respective reviews. Should recommendations to scuttle the transfer arise, they should include conditions-based solutions and paths forward that would result in agency and department approval.
- **Direct** the Department of State and Department of Defense to proactively engage with their Indian counterparts to identify and develop strategies to overcome any potential roadblocks that could hinder Administration approval.
- **Simultaneously develop** a package of proposals to take Indian-U.S. defense relations to new heights, including creative ideas for expanding cooperation on the Andaman and Nicobar Islands, developing a new Joint Maritime Domain Awareness Center, and exploring new iterations of joint air and naval military exercises.

Conclusion

An engine technology deal would be a significant and mutually beneficial opportunity for both Washington and New Delhi, one that bolsters collective security in the Indo-Pacific and elevates the defense partnership to new levels. But to sustain momentum in defense ties, it is incumbent on both sides to prove to each other, and their respective constituencies at home, why these transactions are in the long-term interests of both countries.

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