COMMENTARIES

AMCA Is Not Enough: Why India Needs a Counter-Stealth Doctrine

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EXECUTIVE BRIEF & KEY FINDINGS

India's fifth-generation fighter debate cannot wait for AMCA alone. China already operates the J-20 and is moving ahead with the J-35 family, while Pakistan may eventually gain access to Chinese stealth capability. In such a two-front environment, the real challenge is not only whether India can build its own stealth fighter, but whether it can detect, track and contest adversary stealth aircraft before they compress India's warning time. This commentary argues that India needs a twin-track approach: accelerate AMCA, but simultaneously build a counter-stealth doctrine based on low-frequency radars, passive sensors, photonic radar technologies, IRST, electronic intelligence, airborne surveillance and real-time sensor fusion.

Introduction

India's fifth-generation fighter gap is no longer a distant or theoretical concern. For decades, the Indian airpower debate has focused on squadron strength, legacy fleet replacement, indigenous production and the long-term promise of the Advanced Medium Combat Aircraft. Those questions remain important. However, the regional airpower environment around India is changing faster than India's fifth-generation transition.

China already fields stealth combat aircraft and is steadily expanding the technological depth of the People's Liberation Army Air Force. This matters for India because any future conflict along the northern theatre will not be shaped by aircraft numbers alone. It will also be shaped by the ability to penetrate air defence networks, compress warning time, support long-range precision strikes, conduct electronic warfare and create uncertainty inside India's command-and-control systems. Stealth aircraft are not simply another category of fighter. They are instruments designed to delay detection and disrupt the defender's kill chain.

Pakistan adds a second layer to this challenge. Even if its future fifth-generation pathway remains uncertain, the possibility of Pakistan gaining access to Chinese stealth platforms cannot be dismissed from Indian strategic planning. A limited stealth capability in Pakistani hands may not transform the military balance by itself, but it could complicate crisis stability, strengthen deterrence signalling and introduce a new psychological dimension into the western theatre. In a two-front environment, India cannot afford to wait until adversary stealth capabilities are fully mature before preparing a response.

The AMCA programme is therefore essential, but it cannot be treated as India's only answer to the stealth challenge. AMCA will provide India with a future indigenous fifth-generation platform, greater survivability, advanced avionics, sensor fusion and technological sovereignty. Yet it remains a long-term project. The operational problem facing India is more immediate. What happens in the years before AMCA enters squadron service at meaningful scale? How should India deny freedom of operation to adversary stealth aircraft during this transition period?

The answer lies in a twin-track approach. India must accelerate AMCA as its future fifth-generation combat aircraft, but it must simultaneously build a counter-stealth doctrine supported by low-frequency radars, passive sensors, multistatic detection, photonic radar technologies, infrared search and track systems, airborne surveillance, electronic intelligence and real-time sensor fusion. The objective should not be to search for one magical radar that makes stealth irrelevant. The objective should be to build an integrated detection, tracking and engagement architecture that makes adversary stealth operations uncertain, risky and contested.

India's stealth debate should therefore move beyond the platform race. AMCA is necessary, but AMCA alone is not sufficient. In the age of Chinese stealth and possible Pakistani fifth-generation acquisition, counter-stealth must become an immediate doctrinal requirement for India's air defence and two-front deterrence posture.

Stealth Is Not Invisibility

Stealth is often misunderstood in public debate as invisibility. This is incorrect. A stealth aircraft is not designed to disappear completely from every sensor. It is designed to reduce its detectability across radar, infrared, electronic and visual signatures so that the defender sees it later, tracks it less confidently and reacts with less time. In military terms, stealth does not remove the aircraft from the battlespace. It compresses the defender's decision-making window.

The real purpose of stealth is therefore not merely to avoid radar. Its deeper purpose is to disrupt the enemy's kill chain. A modern air defence system does not function through radar detection alone. It follows a sequence. First, the target must be detected. Then it must be tracked. After that, it must be classified as hostile, prioritised for targeting, engaged by a fighter or missile system, and finally assessed for whether the engagement was successful. This sequence is often described as the kill chain.

Stealth aircraft seek to weaken every stage of this chain. At the detection stage, low-observable shaping and radar-absorbent materials reduce the range at which the aircraft can be seen by conventional radars. This means the defender may not get early warning. At the tracking stage, stealth reduces the quality and consistency of the radar return, making it harder to maintain a stable track. Without a reliable track, an air defence network struggles to assign

interceptors or surface-to-air missiles with confidence.

At the classification stage, stealth creates ambiguity. A weak, intermittent or unclear sensor contact may delay the decision to treat the aircraft as a hostile platform. In a crisis, that delay matters. Air defence commanders must avoid both underreaction and accidental escalation. Stealth exploits this hesitation by forcing the defender to make decisions with incomplete information.

At the targeting and engagement stages, stealth becomes even more dangerous. A missile battery or fighter aircraft may need a fire-control quality track before it can engage effectively. Detecting that something may be present is not the same as being able to shoot it down. A low-frequency radar may provide early warning, but it may not always provide the precision required for weapons engagement. This is why stealth aircraft aim to enter the defender's decision cycle before the defender can generate a complete operational picture.

Even battle damage assessment becomes harder. If the aircraft was only intermittently tracked, the defender may struggle to know whether it was successfully engaged, forced to abort, or escaped undamaged. This uncertainty allows the attacker to preserve psychological and operational pressure. In a high-intensity conflict, uncertainty itself becomes a weapon.

For India, this distinction is important. The challenge posed by stealth aircraft is not that they are impossible to detect. The challenge is that they may be detected too late, tracked too weakly and engaged too slowly. Therefore, counter-stealth must not be understood as the search for a single radar that can "see" stealth aircraft. It must be understood as the ability to restore the kill chain through multiple sensors, rapid fusion, resilient command networks and layered engagement options.

In this sense, stealth is a doctrine of delayed detection, while counter-stealth must become a doctrine of restored awareness. The side that detects first, fuses faster and acts with greater confidence will hold the advantage.

India's Two-Front Stealth Problem

India's stealth challenge must be understood through the logic of a two-front airpower environment. The issue is not merely whether India possesses a fifth-generation aircraft of its own. The deeper question is whether India's air defence architecture can absorb, detect and respond to low-observable aircraft operating from two different strategic directions under conditions of crisis.

China represents the more advanced end of India's stealth challenge. The People's Liberation Army Air Force already operates the J-20, giving China an established fifth-generation platform. However, India's planning should not stop at the J-20. China is also moving forward with the J-35 family, including the land-based J-35A and the carrier-capable J-35. This matters because China's stealth ecosystem is no longer limited to one heavy stealth fighter. It is gradually expanding toward a wider mix of air force and naval stealth platforms.

The J-35A is important because it gives China a second land-based stealth fighter pathway. Unlike the heavier J-20, which is usually viewed as a long-range air superiority and penetration platform, the J-35A appears to represent a medium-weight fifth-generation aircraft with potential roles in air combat, strike missions, networked operations and export diplomacy. For India, the J-35A matters because it could allow China to generate larger numbers of stealth-capable aircraft over time, diversify its mission profiles and complicate India's air defence calculations across the northern theatre.

The naval J-35 adds another dimension. Its carrier-capable design links Chinese stealth aviation to the growth of the People's Liberation Army Navy. The commissioning and testing cycle of the Fujian aircraft carrier, with its electromagnetic catapult system, indicates that China is preparing for a future in which stealth aircraft, carrier aviation, airborne early warning and long-range maritime operations are integrated into a wider power projection architecture. Even if this capability takes time to mature fully, its direction is clear. China is not only building stealth fighters. It is building a stealth-enabled aerospace and maritime ecosystem.

For India, this has direct implications. In a Himalayan scenario, Chinese stealth aircraft could be used to probe radar coverage, support long-range missile targeting, threaten high-value air defence nodes, conduct electronic warfare, escort strike packages and contribute to first-day-of-war operations. In a maritime scenario, the J-35 could eventually support Chinese carrier operations in the wider Indo-Pacific, complicating India's naval air defence and sea control calculations. The result is a broader stealth challenge that spans land, air and maritime domains.

This is why the China problem should be understood as an ecosystem problem rather than a platform problem. India is not only facing the J-20. It is facing a Chinese airpower trajectory in which the J-20, J-35A, naval J-35, airborne early warning aircraft, long-range missiles, drones, satellites, electronic warfare and integrated command networks may operate together. The challenge is not merely aircraft versus aircraft. It is India's kill chain against China's stealth-enabled kill chain.

Pakistan creates a different but still serious problem. Its current airpower structure does not match China's scale or technological depth. However, Pakistan's long-standing defence relationship with China means that the possibility of future access to Chinese fifth-generation platforms cannot be ignored. The reported J-35 pathway remains uncertain and should not be treated as a settled operational reality. Yet Indian planning cannot dismiss the possibility that Pakistan may acquire a limited stealth capability in the coming years if that pathway matures.

Even a small Pakistani stealth fleet would have value beyond its numbers. Militarily, it could complicate Indian air defence planning in the western theatre. Psychologically, it could be used to signal technological parity or deterrent confidence. Politically, it could be projected as evidence that Pakistan has entered the fifth-generation airpower club before India fields AMCA at scale. Operationally, it could allow Pakistan to experiment with stealth-enabled crisis behaviour, especially when supported by Chinese sensors, weapons, training or doctrine.

The greater danger for India is not that Pakistan would suddenly achieve air superiority through stealth aircraft. That would be an exaggeration. The danger is that even a limited stealth capability could create uncertainty during a fast-moving crisis. Indian commanders would have to account for the possibility of low-observable aircraft approaching critical airbases, command nodes, radar sites, logistics hubs or air defence positions. In a compressed escalation environment, uncertainty itself becomes a military tool.

India's two-front stealth problem is therefore not simply a matter of counting aircraft. It is a matter of warning time. A stealth aircraft does not need to be invisible to be useful. It only needs to be detected late enough to shorten the defender's response cycle. In a two-front crisis involving nuclear-armed adversaries, that compression of time can be strategically destabilising.

This is the central challenge for India. China already possesses a mature and expanding stealth capability. Pakistan may gain access to such capability through China in the future. AMCA remains essential, but the period before AMCA enters squadron service at meaningful scale cannot be treated as a strategic vacuum. India must prepare for a battlespace in which stealth aircraft may be used not only for combat, but also for coercion, signalling, probing and disruption.

The Indian response must therefore be doctrinal as much as technological. A two-front stealth problem cannot be solved by one platform or one radar. It requires an integrated counter-stealth architecture that increases warning time, protects critical nodes, restores confidence in the air defence kill chain and denies adversary stealth aircraft the freedom to operate with certainty.

AMCA Is Necessary, But Not Sufficient

India's response to the regional stealth challenge must begin with a clear acknowledgement. The Advanced Medium Combat Aircraft is not optional. It is central to India's future airpower. A country facing two nuclear-armed adversaries, one of which already fields fifth-generation aircraft, cannot indefinitely depend on fourth-generation and 4.5-generation platforms to meet every future operational requirement. AMCA is therefore not merely another fighter programme. It is a strategic requirement for India's technological sovereignty, aerospace industry and long-term combat credibility.

AMCA matters because the future air battlespace will be shaped by survivability, information dominance and the ability to operate inside contested environments. A fifth-generation aircraft is not defined only by external shaping or reduced radar cross-section. Its real value lies in the combination of stealth, sensor fusion, electronic warfare capability, networked operations, advanced avionics and the ability to penetrate defended airspace with a lower probability of detection. For India, this is essential in any future conflict where adversary air defence systems, long-range missiles, electronic warfare platforms and surveillance networks are likely to operate together.

The programme is also important for indigenous capability development. AMCA can become a national technology anchor around which India builds expertise in stealth shaping, advanced materials, engines, avionics, mission computers, weapons integration, electronic warfare suites and high-end manufacturing. In this sense, AMCA is not only about producing a fighter. It is about building an ecosystem. It represents a step toward reducing dependence on external suppliers for the most sensitive layers of combat aviation.

However, recognising AMCA's importance should not lead to doctrinal complacency. AMCA is necessary, but it is not sufficient. The reason is not conceptual weakness. The reason is time. Fifth-generation aircraft programmes are technologically demanding, expensive and slow to mature. Even after prototype development, operational testing, weapons integration, squadron induction, pilot training, maintenance infrastructure and production scaling take years. India may acquire its own fifth-generation capability, but adversary stealth capability may mature before AMCA enters squadron service at meaningful scale.

This transition period is the real danger. China already possesses stealth aircraft and continues to improve the wider ecosystem around them. Pakistan may gain access to Chinese fifth-generation platforms if its pathway toward systems such as the J-35 matures. India cannot allow the years before AMCA's full operational availability to become a period of strategic vulnerability. Waiting for a symmetrical platform response alone would leave a gap between the emergence of the threat and India's ability to answer it with its own fifth-generation aircraft.

This is why counter-stealth must develop in parallel with AMCA. India needs AMCA for offensive reach, survivability, deep penetration and future air superiority. But India also needs counter-stealth systems to protect its airspace, preserve warning time and deny adversary stealth aircraft the confidence to operate freely. These two requirements are not competing priorities. They are complementary pillars of the same airpower strategy.

AMCA will give India its own fifth-generation capability. Counter-stealth will ensure that adversary fifth-generation aircraft do not operate freely before AMCA arrives. The strategic choice before India is therefore not AMCA versus counter-stealth. It is AMCA plus counter-stealth.

Case Study: Submarine Warfare and the Logic of Counter-Stealth

The history of submarine warfare offers an important analogy for India's emerging stealth challenge. Submarines changed naval warfare because they created a concealment-based threat. They could move below the surface, approach targets without visual detection and attack ships before conventional naval forces could respond. Their power did not come from invulnerability. It came from delayed detection, uncertainty and surprise.

The first response to submarines was not one perfect anti-submarine weapon. Navies did not defeat the submarine threat by building a single platform or sensor that made underwater warfare irrelevant. Instead, anti-submarine warfare evolved as a layered ecosystem. Surface escorts protected convoys. Hydrophones and sonar improved underwater detection. Radar-equipped aircraft extended surveillance over sea lanes. Patrol aircraft, escort carriers, depth charges, mines, intelligence networks, acoustic arrays, radio direction finding, patrol patterns and command networks gradually turned submarine hunting into a coordinated system.

This evolution is important because it shows how militaries respond to concealment-based technologies. Submarines forced navies to think beyond platform-to-platform competition. A battleship could not solve the submarine problem by itself. A destroyer could not solve it alone. An aircraft could not solve it alone. The answer was a networked architecture that combined detection, tracking, classification, engagement and operational coordination. Anti-submarine warfare became a doctrine before it became a collection of tools.

Yet submarines were never made irrelevant. Even today, they remain among the most survivable and strategically valuable platforms in modern warfare. What anti-submarine warfare achieved was not the elimination of submarines, but the reduction of their freedom of manoeuvre. It made submarine operations more uncertain, more risky and more dependent on careful planning. It forced submarines to alter routes, reduce emissions, avoid certain zones and operate under the constant possibility of detection.

The same logic applies to stealth aircraft. A stealth fighter, like a submarine, is not magical. It is designed to exploit concealment, delay detection and create uncertainty inside the defender's decision cycle. Therefore, the response to stealth should not be built around the search for one perfect anti-stealth radar. Just as submarines were contested through sonar, aircraft, escorts, intelligence and acoustic networks, stealth aircraft must be contested through low-frequency radars, passive sensors, multistatic detection, IRST systems, electronic intelligence, airborne surveillance, space-based monitoring and real-time sensor fusion.

For India, this analogy is especially relevant. AMCA will give India its own fifth-generation capability, but counter-stealth systems must ensure that adversary fifth-generation aircraft do not enjoy uncontested freedom before AMCA arrives. The objective should not be to make stealth aircraft irrelevant. That would be unrealistic. The objective should be to make stealth unreliable.

A stealth aircraft that cannot be certain of remaining undetected loses part of its operational advantage. A stealth mission that must account for passive sensors, low-frequency radar coverage, airborne detection, electronic intelligence and networked air defence becomes more complex. A pilot who may be detected, tracked or forced to expose himself earlier than expected operates under pressure. That pressure is itself a form of deterrence.

The lesson from submarine warfare is therefore clear. Concealment-based platforms are not countered by waiting for a symmetrical platform alone. They are countered by building layered systems that deny certainty, reduce freedom of manoeuvre and restore the defender's kill chain. For India, counter-stealth should follow the same logic. The aim is not to defeat stealth as a technology. The aim is to contest stealth as a doctrine.

From Anti-Stealth Radar to Counter-VLO Doctrine

India's response to stealth aircraft should not be framed around the narrow idea of an "anti-stealth radar." That phrase creates the impression that the problem can be solved by one sensor, one frequency band or one technological breakthrough. This is misleading. Stealth is not defeated by a single radar in the same way that submarine warfare was not defeated by a single sonar. It is contested through doctrine, architecture and integration.

A more useful concept for India is a Counter-VLO Aerospace Denial Doctrine. VLO stands for very low observable. It refers to aircraft designed to reduce their radar, infrared, electronic and visual signatures so that they are detected later, tracked less reliably and engaged with greater difficulty. The term is more accurate than simply calling such aircraft "invisible," because stealth platforms are not invisible. They are designed to reduce the defender's confidence and compress the defender's reaction time.

A Counter-VLO Aerospace Denial Doctrine should therefore be built around one central purpose: to deny low-observable aircraft the certainty of penetration. The objective is not to promise that every stealth aircraft will be detected early and destroyed. That would be unrealistic. The objective is to create a battlespace in which stealth aircraft cannot assume that they will remain undetected, cannot depend on predictable gaps in radar coverage and cannot complete missions without being exposed to multiple layers of detection and response.

This requires India to move from a sensor-centric approach to a kill-chain restoration approach. A stealth aircraft weakens the air defence kill chain by delaying detection, degrading tracking, creating classification ambiguity and complicating engagement. A counter-VLO doctrine must restore that chain through multiple overlapping systems. It must detect, correlate, classify, track and engage low-observable aircraft through a combination of low-frequency radars, passive sensors, multistatic radar networks, infrared search and track systems, electronic intelligence, airborne surveillance, space-based monitoring and integrated command networks.

Each layer has a different role. Low-frequency radars may provide early warning or cueing. Passive sensors may detect disturbances or emissions without revealing their own location. Multistatic systems can observe a target from different angles, reducing the advantage of stealth shaping. IRST systems offer a non-radar method of detection by tracking heat signatures. Electronic intelligence can identify emissions from aircraft, datalinks or supporting systems. Airborne and space-based surveillance can expand the observation area. Command-and-control networks can convert weak, partial or intermittent detections into a more coherent operational picture.

The doctrinal centre of gravity is fusion. A stealth aircraft may reduce its signature against a specific radar, but it cannot equally suppress every signature across every band, angle, sensor type and domain. The counter-stealth challenge is to combine imperfect data from different sources quickly enough to produce operationally useful warning, tracking and engagement options. In this sense, the answer to stealth is not one radar. It is an architecture.

For India, this architecture should serve a wider aerospace denial purpose. It should protect critical airbases, radar stations, command nodes, missile units, logistics hubs and strategic infrastructure. It should complicate adversary planning in both the northern and western theatres. It should force hostile stealth aircraft to fly less efficient routes, operate under emission discipline, expose themselves to supporting sensors or accept greater mission risk. Even if it does not guarantee interception in every case, it can reduce the freedom, confidence and surprise on which stealth operations depend.

A Counter-VLO Aerospace Denial Doctrine would also help India avoid a false debate between AMCA and counter-stealth. AMCA is essential for India's own fifth-generation airpower. Counter-VLO doctrine is essential for denying adversary fifth-generation aircraft operational freedom before AMCA enters service at scale. One is an offensive and

technological sovereignty requirement. The other is a defensive and deterrence requirement. India needs both.

The shift, therefore, is conceptual. India should not ask whether it can build a radar that “sees stealth.” It should ask whether it can build a network that makes stealth uncertain. The future of air defence will belong not to the side that owns one superior sensor, but to the side that fuses more information, faster, across more domains.

The Counter-Stealth Architecture India Needs

A serious counter-stealth strategy for India cannot depend on one radar, one platform or one service. It must be built as a layered architecture in which different sensors compensate for each other’s weaknesses. Stealth aircraft are designed to reduce detection against specific radar bands, angles and engagement systems. They are not equally invisible across every frequency, sensor type, altitude, flight profile and operational condition. The purpose of India’s counter-stealth architecture should therefore be to create overlapping detection opportunities across the northern and western theatres.

The first layer should be low-frequency radar. Very high frequency and ultra high frequency radars are often discussed in the counter-stealth context because many stealth aircraft are primarily optimised against higher-frequency fire-control radars. Low-frequency systems may not always provide the precision required for immediate missile engagement, but they can provide early warning, cue other sensors and alert the air defence network that a low-observable platform may be present. Their role should be understood as the beginning of the kill chain, not the entire kill chain.

The second layer should be passive coherent location systems. These systems do not emit their own radar signal. Instead, they exploit existing sources of electromagnetic energy such as television, radio, mobile communication, navigation signals or other emitters to detect disturbances caused by aircraft movement. Their advantage is that they are harder for the adversary to locate and suppress because they do not behave like conventional radar sites. For India, passive detection would be useful in a crisis because it can strengthen airspace awareness without immediately revealing the position of every sensor node.

The third layer should be multistatic radar. A conventional radar usually transmits and receives from the same site. Multistatic systems separate transmitters and receivers across different locations. This matters against stealth aircraft because low-observable shaping is often designed to deflect radar energy away from the emitter. When sensors observe the aircraft from multiple angles, the aircraft’s ability to manage its radar signature becomes more difficult. For India, multistatic networks could help complicate stealth ingress routes by denying adversary aircraft a predictable radar geometry.

The fourth layer should be photonic radar technologies. Photonic radar should not be confused with speculative claims about magical stealth detection. Its value lies in higher bandwidth, improved signal processing, lower noise, better precision and faster handling of complex radar data. India should treat photonic technologies as part of a broader radar modernisation effort, especially for future systems that require sharper resolution, improved electronic protection and rapid processing of weak or complex returns. Photonic radar will not replace other sensors, but it can strengthen the quality and speed of detection and tracking.

The fifth layer should be infrared search and track systems. IRST provides a non-radar method of detection by identifying thermal signatures. This matters because stealth aircraft may reduce radar cross-section, but they still produce heat through engines, skin friction, exhaust and aerodynamic activity. IRST systems are not a perfect solution. Weather, range, altitude and background conditions affect their performance. However, when combined with radar and electronic intelligence, IRST can add an important independent detection path that does not require the defender to radiate.

The sixth layer should be electronic intelligence. Even stealth aircraft operate within a wider electronic ecosystem. They may use datalinks, radar, navigation systems, communication channels or be supported by airborne early warning aircraft, tankers, drones and electronic warfare platforms. ELINT systems can help detect, classify and map this wider signature environment. The aircraft itself may remain difficult to track, but its supporting network may reveal patterns, direction, timing and intent. In modern air warfare, sometimes the system around the stealth aircraft is easier to detect than the aircraft itself.

The seventh layer should be airborne early warning and control aircraft. Ground-based sensors are constrained by terrain, curvature of the earth, basing patterns and survivability. AEW&C platforms extend the battlespace picture and provide mobile surveillance, command and control, fighter direction and wider situational awareness. For India, this is especially important in the Himalayan theatre, where terrain can create radar shadows and reduce the effectiveness of ground-based coverage. AEW&C assets can help connect scattered sensor inputs into a wider operational picture.

The eighth layer should be space-based surveillance. Satellites cannot replace tactical radars, but they can contribute to strategic warning, airbase monitoring, launch indicators, movement tracking, electronic mapping and theatre-level awareness. In a crisis, space-based surveillance can help India detect unusual activity at adversary airbases, forward deployments, tanker movements, missile positioning and changes in air defence posture. This can provide warning before stealth aircraft are even airborne.

The ninth layer should be sensor fusion through integrated air defence networks. This is the most important layer because counter-stealth is ultimately a data problem. A low-frequency radar may provide a weak warning. A passive sensor may detect a disturbance. An IRST system may indicate a thermal contact. ELINT may detect emissions from supporting platforms. AEW&C may add altitude and direction. None of these inputs may be decisive alone. But fused together, they can create a more reliable operational picture. Systems such as Akashteer-style integrated air defence networks point toward this requirement by linking sensors, shooters and command nodes into a faster decision-making structure.

The final layer should be engagement through layered surface-to-air missiles and fighter interception. Detection alone is not enough. India must be able to convert warning into action. This requires short, medium and long-range air defence systems, fighter aircraft, airborne controllers, electronic warfare support and resilient communications. In some cases, the aim may be to shoot down the aircraft. In others, it may be enough to force the aircraft to change course, abort the mission, radiate, climb, expose itself or lose timing. A failed stealth mission is also a counter-stealth success.

Each layer of this architecture has limitations. Low-frequency radars may lack fire-control precision. Passive systems depend on the electromagnetic environment. Multistatic networks require complex coordination. IRST can be affected by weather and range. ELINT depends on adversary emissions. AEW&C aircraft are high-value targets. Satellites may not provide continuous tactical coverage. Sensor fusion networks are vulnerable to cyber, electronic and physical attack. SAMs and fighters require timely targeting data.

Yet this is precisely why India needs an architecture rather than a single solution. The strength of counter-stealth lies in combination. If one sensor is degraded, another may provide cueing. If one detection is weak, another may confirm it. If one radar cannot track, another system may classify. If the aircraft cannot be engaged immediately, it can still be forced into uncertainty. Together, these layers can make stealth operations more complex, more risky and less predictable.

For India, the objective should not be to create an illusion of perfect detection. The objective should be to deny adversary stealth aircraft operational confidence. A stealth platform that must fly through overlapping low-frequency radar coverage, passive detection zones, multistatic geometries, IRST fields, ELINT monitoring, airborne surveillance and fused air defence networks cannot assume freedom of action. That is the practical meaning of counter-stealth. It is

not a promise to see everything. It is a doctrine to ensure that the adversary can never be certain that it remains unseen.

Quantum Radar Versus Photonic Radar

India’s counter-stealth debate should avoid technological hype. Quantum radar and photonic radar are often discussed together, but they are not the same. Photonic radar is the more relevant near and medium-term technology for India’s counter-stealth ecosystem. It uses optical and photonic components for radar signal generation, processing, conversion and handling of high-bandwidth data. This can improve precision, bandwidth, signal quality and electronic resilience.

Quantum radar should be treated differently. It remains a frontier research area linked to quantum illumination and quantum sensing. It may offer long-term possibilities in target detection, but it should not be presented as an operational answer to Chinese or Pakistani stealth aircraft in the near term. The technology is still debated, experimentally complex and not mature enough to become the foundation of India’s counter-stealth doctrine.

India should invest in quantum radar research, but it should not build its counter-stealth doctrine around a technology that is not yet operationally mature. The more realistic priority is to strengthen low-frequency radars, passive detection, multistatic radar networks, photonic radar technologies, IRST, ELINT, airborne surveillance and sensor fusion.

In other words, quantum radar belongs to India’s long-term research horizon. Photonic radar belongs more directly to the near and medium-term counter-stealth architecture.

Doctrinal Objective

The objective of India’s counter-stealth doctrine should be defined realistically. India does not need to detect every stealth aircraft perfectly at every moment. That is neither technically realistic nor doctrinally necessary. The purpose of counter-stealth is not to create an illusion of complete visibility. The purpose is to make adversary stealth missions uncertain, risky and time-sensitive.

A stealth aircraft derives much of its advantage from confidence. It assumes that it can enter defended airspace with delayed detection, reduced tracking quality and limited warning for the defender. India’s counter-stealth architecture should attack that confidence. If an adversary pilot or mission commander cannot be certain that the aircraft will remain undetected, the value of stealth begins to decline. The mission becomes more complex. The route becomes less predictable. The aircraft may have to fly around suspected sensor zones, change altitude, reduce emissions, depend more heavily on support platforms or accept a higher probability of exposure.

The first doctrinal objective should be to deny surprise. Even a weak or partial detection can be valuable if it alerts the air defence network that a low-observable threat may be present. The second objective should be to increase warning time. In a two-front crisis, a few additional minutes of warning can allow dispersal, activation of air defence systems, launch of interceptors and protection of critical assets.

The third objective should be to force adversary aircraft to alter routes. Stealth aircraft are most effective when they can choose optimal ingress paths, exploit radar gaps and arrive at the target at a time of their choosing. A layered counter-stealth network can force them into less efficient paths, longer routes or more predictable corridors. The fourth objective should be to compel stealth aircraft or their supporting systems to radiate, communicate or expose themselves. A stealth platform may maintain emission discipline, but it rarely operates alone. Its wider ecosystem of datalinks, electronic support, airborne early warning, tankers, drones and strike packages may reveal intent and direction.

The fifth objective should be to protect critical airbases, radar sites, command nodes, missile units, logistics hubs and strategic infrastructure. Stealth aircraft are especially dangerous when used against the nervous system of a defender's warfighting capability. India's counter-stealth doctrine should therefore prioritise the survivability of those nodes that allow the country to see, decide and respond.

The sixth objective should be to preserve retaliatory options. In a fast-moving crisis, the ability to absorb an initial strike, maintain command continuity and respond with calibrated force is central to deterrence. Counter-stealth systems strengthen this posture by reducing the chance that an adversary can achieve a clean first strike against high-value targets. The seventh objective should be to strengthen two-front deterrence by making both China and Pakistan account for India's ability to contest low-observable aircraft across multiple theatres.

The objective, therefore, is not to make stealth useless. The objective is to make stealth unreliable. A stealth aircraft that must operate under the fear of partial detection, sensor fusion, passive tracking, electronic exposure and layered engagement is no longer operating with uncontested advantage. It may still be difficult to detect. It may still be dangerous. But it is no longer certain of success.

For India, that is the doctrinal benchmark. Counter-stealth should not promise perfect detection. It should create persistent doubt inside adversary planning. In air warfare, doubt can be as important as destruction. If India can force adversary stealth aircraft to hesitate, reroute, radiate, abort or operate under constant uncertainty, it will have restored a critical part of deterrence.

Policy Recommendations

India's counter-stealth response must be treated as a national air defence priority, not as a narrow radar procurement issue. The challenge is doctrinal, technological and organisational at the same time. A serious response requires parallel investment in AMCA, counter-stealth sensors, integrated air defence networks, joint command structures and indigenous technology capacity.

First, India must accelerate AMCA without treating it as the only solution. AMCA remains essential for India's future fifth-generation airpower, survivability and technological sovereignty. However, the counter-stealth requirement cannot wait for AMCA to enter squadron service at scale. India should pursue AMCA as the offensive pillar of its fifth-generation strategy while building counter-stealth as the defensive pillar.

Second, India should create a national counter-stealth sensor roadmap. This roadmap should identify priority technologies, timelines, production partners, testing ranges, theatre deployment needs and integration standards. It should not be left to fragmented procurement decisions. The aim should be to build a coherent counter-VLO architecture that supports air defence across the northern and western theatres.

Third, India should prioritise low-frequency, passive, multistatic and photonic radar technologies. Low-frequency radars can provide early warning and cueing. Passive systems can detect without exposing themselves. Multistatic radars can complicate stealth shaping by observing aircraft from multiple angles. Photonic radar technologies can strengthen bandwidth, precision, signal processing and future radar performance. These technologies should be developed as complementary layers rather than competing solutions.

Fourth, India must integrate radar, IRST, ELINT, AEW&C and space-based inputs into a common air picture. Counter-stealth will depend less on one perfect detection and more on the fusion of many imperfect signals. A weak radar contact, an infrared signature, an electronic emission, an airborne surveillance input and a satellite-derived warning may become operationally valuable only when fused quickly. India's priority should be to shorten the time between detection,

classification, tracking and engagement.

Fifth, India should build dedicated counter-stealth coverage across the northern and western theatres. The Himalayan front presents unique challenges because of terrain, altitude, radar shadows and infrastructure constraints. The western theatre presents different problems because of shorter distances, compressed warning time and the possibility of rapid escalation. India should not apply a uniform template to both fronts. Counter-stealth deployment must be theatre-specific.

Sixth, India must strengthen joint air defence between the Air Force, Army and Navy. Stealth aircraft will not respect service boundaries. A low-observable threat may be detected by one service, tracked by another and engaged by a third. Therefore, counter-stealth doctrine must be supported by joint command arrangements, common data standards, shared operating pictures and regular tri-service air defence exercises.

Seventh, India should invest in deception, decoys, mobility and redundancy for critical assets. Counter-stealth is not only about detection. It is also about survival. Airbases, radar sites, command nodes, missile units, communication hubs and logistics centres should be protected through hardened shelters, mobile systems, decoy emitters, rapid repair capabilities and distributed basing. If an adversary cannot confidently locate or destroy India’s critical nodes, stealth loses part of its first-strike value.

Eighth, India should conduct regular exercises that simulate stealth aircraft ingress. These exercises should test not only radars, but the full kill chain. The aim should be to examine how quickly Indian forces can detect, correlate, classify, track and respond to low-observable threats under electronic warfare, cyber disruption and missile attack conditions. Exercises should include red-team simulations, degraded communications, false targets and multi-axis attacks.

Ninth, India should build indigenous industry capacity for radar components, photonics, signal processing and AI-based sensor fusion. Counter-stealth systems will require advanced semiconductors, gallium nitride modules, photonic components, high-speed processors, secure communication links, algorithms and electronic warfare resilience. Without domestic industrial depth, India may remain dependent on external suppliers for the most sensitive parts of its air defence architecture.

Finally, India should institutionalise counter-stealth as a doctrine, not a project. The objective should be to ensure that every future air defence upgrade, radar procurement, AEW&C programme, space surveillance initiative and command network contributes to a larger counter-VLO architecture. India’s goal should not be to claim that it can see every stealth aircraft at all times. The goal should be to ensure that adversary stealth aircraft can never operate with certainty, surprise or uncontested freedom.

Conclusion

India’s stealth debate should not be reduced to a race between AMCA and adversary fifth-generation aircraft. That framing is too narrow. The real question is whether India can build a doctrine that contests stealth before, during and after AMCA enters service. AMCA remains essential for India’s future airpower, but the years before it becomes available at meaningful scale must not become a period of strategic vulnerability.

Stealth aircraft are designed to delay detection, weaken tracking and compress the defender’s response time. India’s answer must therefore go beyond the search for one anti-stealth radar. It must build a counter-VLO aerospace denial architecture that combines low-frequency radars, passive sensors, multistatic detection, photonic radar technologies, IRST, ELINT, AEW&C, space-based surveillance and real-time sensor fusion.

The objective is not to make stealth useless. That would be unrealistic. The objective is to make stealth unreliable. If adversary stealth aircraft cannot be certain of entering Indian airspace undetected, cannot rely on clean targeting, cannot assume predictable radar gaps and cannot complete missions without facing layered detection and engagement risks, then India would have restored a vital part of deterrence.

For India, the correct approach is AMCA plus counter-stealth. AMCA will give India its own fifth-generation combat capability. Counter-stealth will ensure that Chinese or Pakistani fifth-generation aircraft do not enjoy uncontested freedom before AMCA matures. In a two-front environment, this is not a technical luxury. It is a doctrinal necessity.

?The views expressed are those of the authors and do not represent the views of CNAWS.

Image Source: ChatGPT