

PAF vs IAF

FROM BALAKOT TO 2036

Air Power, Networked Warfare, Procurement and the Future Balance



An educational, well-researched analysis based on open-source information and claims reported worldwide.

Written by Muhammad Sohail Ashraf

Revised and expanded English edition | August 2026

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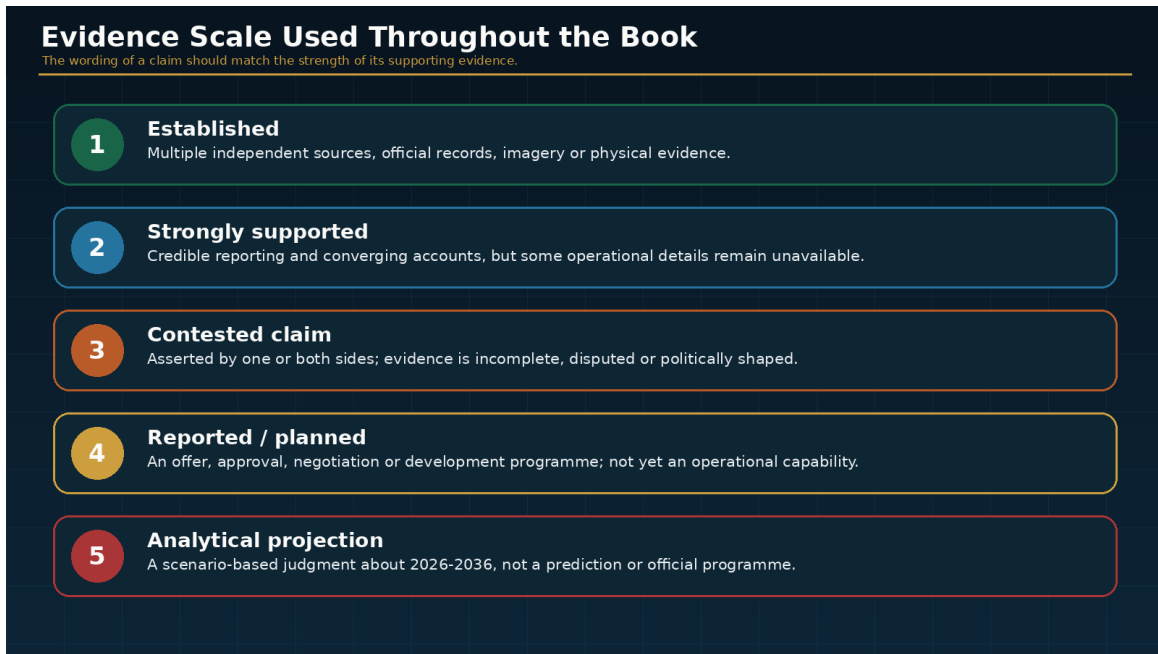


Figure 0.1. Evidence vocabulary used throughout the study. This prevents official claims, reported procurement and future scenarios from being presented as the same kind of fact.

PUBLICATION STATEMENT

An educational, well-researched analysis based on open-source information and claims reported worldwide.

This is an independent educational study. It does not represent the Pakistan Air Force, Indian Air Force, any government, manufacturer or news organisation. It analyses military systems at a strategic and operational level and does not provide targeting instructions or classified information.

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About the Writer

Muhammad Sohail Ashraf is an independent researcher with academic and professional experience in mathematics, computer networks, system security, data analysis, teaching and practical security work. His air-power research focuses on systems thinking: how aircraft, sensors, software, command structures, logistics and political objectives interact in real conflict.

The purpose of this book is not to produce a patriotic inventory list. It is to explain why Pakistan has sometimes created operational effects disproportionate to its resources, why India retains a much higher structural ceiling, and how the balance could evolve between 2026 and 2036.

Method and Evidence

The study uses five evidence categories: Established; Strongly supported; Contested claim; Reported or planned; and Analytical projection. Wartime statements are not treated as fact merely because they are official. Conversely, the absence of complete public evidence is not used to erase events supported by converging reporting, physical evidence or acknowledgements from multiple sides.

The narrative gives substantial analytical weight to Pakistan's demonstrated strengths in readiness, controlled retaliation and network integration. It also records the limits of public evidence and recognises India's adaptation, industrial breadth and long-war advantages. This approach is intended to preserve credibility rather than manufacture artificial neutrality.

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CHAPTER 01

Historical Overview: From Partition to the Networked Era

One concise chapter of context: generations, wars, procurement choices and institutional lessons.

CHAPTER ARGUMENT

The enduring asymmetry is simple: India has always possessed the larger demographic, economic and industrial base, while Pakistan has had to design military effectiveness around scarcity. This did not produce a permanently superior force on either side. It produced different optimisation problems. India could sustain a broad inventory, multiple suppliers and large geographic coverage. Pakistan had stronger incentives to concentrate its best aircraft, standardise procedures, keep decision chains short and preserve a higher proportion of the fleet for the principal eastern threat.

KEY THEMES asymmetry | institutional culture | procurement

EXECUTIVE OVERVIEW

خلاصہ رپورٹ

1 OVERVIEW | خلاصہ



This book presents a scenario-based open-source assessment of the Pakistan Air Force and Indian Air Force from 2026 to 2036. It focuses on capability trends, force design, procurement paths, multi-domain integration, and conflict risks. It is not a prediction, but a structured analytic study.

یہ کتاب 2026 سے 2036 تک پاکستان ایئر فورس اور انڈین ایئر فورس کا اوپن سورس اور منظر نامہ بنیاد تجزیہ پیش کرتی ہے۔ اس میں صلاحیتوں کے رجحانات، فورس ڈیزائن، خریداری کے راستے، کثیر المجال انضمام، اور تصادم کے خطرات شامل ہیں۔ یہ کوئی حتمی پیش گوئی نہیں بلکہ منظم تجزیاتی مطالعہ ہے۔

2 FIVE STRATEGIC PILLARS | پانچ تزویراتی ستون



Air Combat
فضائی جنگ



IADS
مربوط فضائی دفاع



Space-Cyber-EMSO
خلاء، سائبر، ای ایم ایس او



Industrial Base
صنعتی بنیاد



Escalation Risk
کشیدگی کا خطرہ

3 STRENGTHS SNAPSHOT (HIGH-LEVEL) | صلاحیتوں کا مختصر جائزہ (اعلیٰ سطح)

PAKISTAN پاکستان

- Networked integration
- Cost-efficient modernization
- Closer China-linked pipeline
- High training emphasis
- Smaller force depth

VS

INDIA بھارت

- Larger force structure
- Broader budget base
- Inventory depth
- Long procurement pipeline
- Complex integration burden

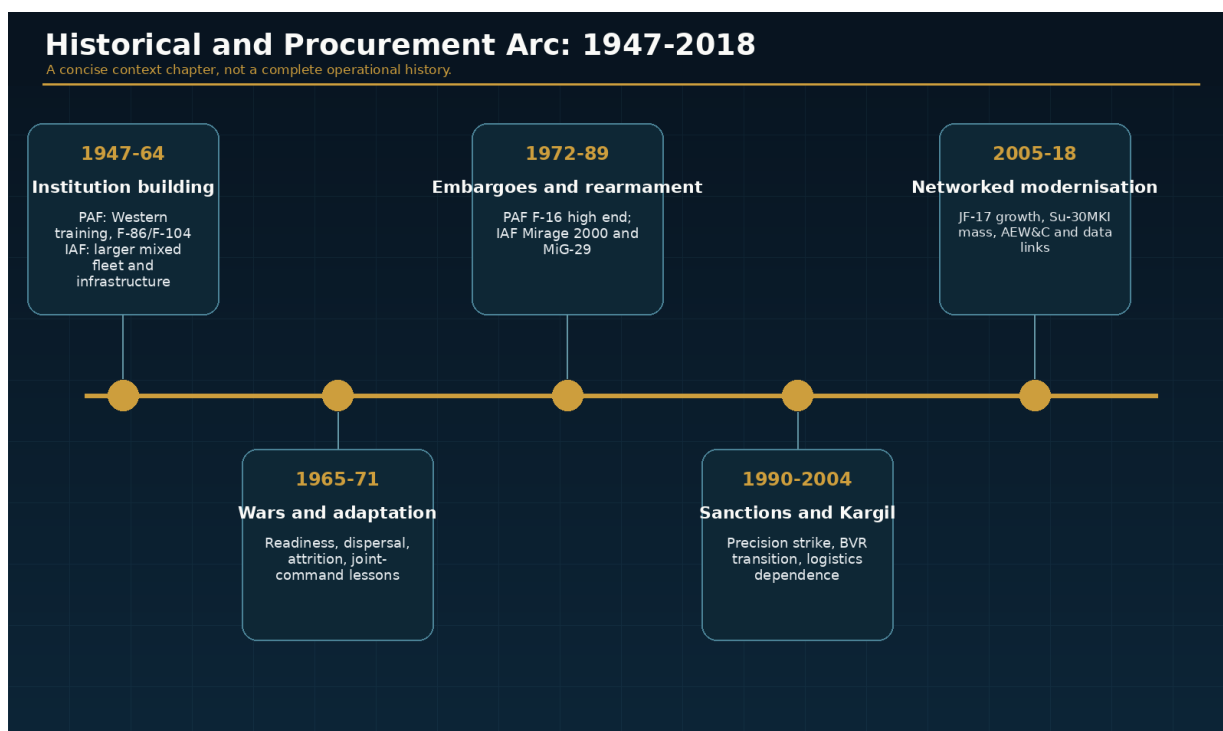


Figure 1.1. The rivalry developed through different procurement ecosystems: Pakistan sought concentrated quality and readiness; India built a larger but more diverse force.

1947-1964: institution building and the first jet generation

The rivalry began with an unequal division of institutions rather than with an equal race between two mature air forces. India inherited most of the Royal Indian Air Force's physical infrastructure, training establishments, maintenance capacity and industrial base. Pakistan inherited fewer airfields, fewer experienced technical personnel and the immediate problem of defending two wings separated by more than a thousand miles of Indian territory. These structural facts did not make Pakistan militarily irrelevant, but they shaped a culture that placed unusual emphasis on readiness, concentration and the efficient use of scarce assets.

During the first Kashmir war, airpower was used primarily for transport, reinforcement, reconnaissance and logistical support rather than large-scale air-to-air combat. Mountain geography magnified the value of lift and communications. The central lesson was that airpower was not limited to fighters: the ability to move troops, sustain isolated positions and create an accurate picture of events could alter the ground campaign. This lesson would later reappear in more technologically advanced form through airborne warning, satellite imagery and data-linked command systems.

India's larger territory created both advantages and burdens. It possessed greater strategic depth and more infrastructure, but it also had to distribute forces across a wider space and consider several borders. Pakistan's narrower strategic depth made its air bases and command nodes more vulnerable, yet it also encouraged a more concentrated threat model. The geographic asymmetry became a permanent feature of the rivalry: India could absorb and regenerate more, while Pakistan had a stronger incentive to gain decision advantage early in a crisis.

Pakistan's membership in US-backed security arrangements opened access to F-86 Sabres, F-104 Starfighters, B-57 bombers, radar equipment and training. The resulting force was not large enough to eliminate India's numerical advantage, but it gave the Pakistan Air Force a coherent Western equipment and training base. The PAF invested heavily in flying standards, centralised control, air-defence alert and the prestige of a professional service. These institutional choices became as important to its identity as the aircraft themselves.

India followed a broader path. It operated Hunters, Gnats, Mystères, Canberras and growing numbers of Soviet aircraft. The IAF's force was larger and more diverse, reflecting India's wider diplomatic options and industrial ambitions. Diversity supplied strategic flexibility, but it also produced different maintenance, training and weapons ecosystems. This tension between breadth and integration remains visible in the IAF of the 2020s.

The F-104 became a symbol of technological modernity, but its value was constrained by small numbers, mission design and maintenance demands. The F-86 was less dramatic but more relevant to sustained tactical operations.

On the Indian side, the small Gnat developed a reputation as an effective close-combat opponent, while Hunters and Canberras provided strike capability. The lesson is enduring: headline speed or altitude figures do not by themselves determine operational value. Availability, weapons, pilot confidence, radar support and mission fit matter more.

1965 and 1971: from local advantage to geographic decision

The 1965 war was the first large jet-age air contest between the two states. It remains surrounded by incompatible victory claims, disputed loss figures and powerful national narratives. A responsible assessment begins by separating tactical performance from strategic outcome. Pakistan's pilots and controllers generally demonstrated strong preparation, and the PAF achieved notable successes with a smaller force. India nevertheless generated more sorties, retained substantial combat capacity and prevented the PAF from delivering a decisive strategic result.

The PAF benefited from a relatively coherent equipment system, strong air-defence control and familiarity with its principal aircraft. The IAF faced the difficulty of employing a much larger and more varied inventory under wartime pressure. Indian aircraft were also vulnerable on the ground during attacks on bases, demonstrating that force size is meaningless if aircraft, fuel and runways are not protected and dispersed. Pakistan, however, had fewer reserves and could not afford a prolonged rate of attrition.

The most useful lesson is not a simple winner-loser statement. The conflict showed that a smaller air force can generate local superiority through concentration, training and command. It also showed the limits of tactical brilliance when national objectives, ground operations and sustainment do not produce a decisive strategic effect. Both services learned: India strengthened radar, base defence and command arrangements, while Pakistan recognised the danger of dependence on a single foreign supplier.

The 1971 war cannot be understood as a simple replay of 1965. Pakistan faced an almost impossible geographic problem: East Pakistan was isolated from the western wing, surrounded by India and politically destabilised by a civil conflict and humanitarian catastrophe. India's military strategy combined political preparation, support to the Mukti Bahini, a favourable diplomatic environment and a coordinated campaign. In the east, the IAF achieved air superiority quickly and used it to support a rapid ground advance.

The PAF's eastern detachment was small and could not be sustained or reinforced at scale. Once runways, fuel and aircraft availability were degraded, the air contest in the east became increasingly one-sided. Indian airpower interdicted movement, supported ground forces and helped isolate command centres. The result demonstrated that airpower is most decisive when it is integrated with a coherent political and joint campaign rather than treated as a separate duel between pilots.

In the western theatre, the contest was more balanced, and Pakistan retained the ability to conduct strikes and air defence. Yet the overall strategic result was determined by the eastern collapse. India's victory and the creation of Bangladesh transformed the regional balance. It also reinforced India's confidence in mass, joint planning and strategic depth, while Pakistan confronted the consequences of geographic overextension and political failure.

1972-1998: Mirages, F-16s, MiG-29s and the fourth-generation transition

The post-1971 decades produced a complex rebuilding race. Pakistan expanded its Mirage III and Mirage 5 force, operated Chinese F-6 variants and sought to maintain a credible strike capability despite financial and supply limitations. India continued the large-scale induction of MiG-21 variants and added aircraft such as the Jaguar, MiG-23 and MiG-27. The IAF increasingly possessed the larger and more diverse inventory, while the PAF focused on preserving competence and identifying a high-quality replacement for its older fighters.

The Mirage family became especially important to Pakistan because it offered speed, range and strike potential outside the American supply chain. Decades later, Project ROSE upgrades demonstrated the PAF's ability to modernise old airframes with new navigation, attack and electronic systems. This was not a substitute for new aircraft, but it reflected an institutional skill in integration and life extension.

India's Soviet relationship delivered scale and relative supply security, but it also created a long-term dependence on Russian-origin engines, spares and design philosophies. The Jaguar added deep-strike capability, while the MiG-21 remained a numerical backbone. India's industrial collaboration with the Soviet Union and later Russia

generated valuable manufacturing experience, though licensed production did not automatically provide full design sovereignty.

The 1980s transformed the quality of the rivalry. Pakistan's acquisition of the F-16 gave it a modern multirole fighter with excellent handling, radar, weapons potential and growth capacity. The Afghan war increased Pakistan's strategic importance to Washington and provided access to equipment and training. The F-16 became more than an aircraft; it became the high-end reference point around which PAF tactics, pilot selection and maintenance standards were organised.

India responded to regional developments and its wider strategic requirements with the Mirage 2000 and MiG-29, while continuing to build the Su-30 pathway that would later dominate its inventory. The Mirage 2000 offered a particularly reliable precision-strike and air-defence platform. The MiG-29 provided a powerful air-superiority capability for its period. India therefore did not lack high-quality aircraft, but it had to integrate them with a much larger Soviet-origin fleet and a more dispersed command structure.

The introduction of active radar-guided beyond-visual-range missiles was gradual and uneven. Sensors, identification rules and command arrangements often limited theoretical missile range. Air forces remained cautious because a long-range shot without reliable identification could cause fratricide or political escalation. The later value of airborne early warning and secure data links lies partly in reducing that uncertainty.

Kargil, sanctions and the rise of the JF-17

Kargil was a limited high-altitude conflict fought under a nuclear shadow and strict political constraints. India initially hesitated to employ airpower and then directed the IAF to operate without crossing the Line of Control. The mountainous environment complicated target detection, weapon delivery and helicopter operations. Early losses highlighted the danger of shoulder-launched missiles and the difficulty of attacking small positions on steep terrain.

The IAF adapted by using higher-altitude profiles and Mirage 2000 aircraft with precision-guided munitions. Air strikes against supply points and fortified positions contributed to the wider campaign by increasing pressure on forces occupying the heights. The importance of precision was not simply accuracy: it allowed India to generate military effect while respecting political boundaries intended to prevent a wider war.

Pakistan's air force did not enter a large air battle. The reasons remain debated, but escalation control, political constraints and the risk of exposing the operation's scale were central. Kargil therefore cannot be used as a direct measurement of PAF versus IAF fighter quality. It is better understood as a case study in civil-military decision-making, joint planning and the conditions under which political leaders permit airpower to be used.

Pakistan's search for a replacement for F-7s, A-5s and ageing Mirages produced the JF-17, jointly developed with China and manufactured at Pakistan Aeronautical Complex. The programme's strategic importance exceeds the performance of any single block. It created a domestic assembly and integration base, trained engineers, reduced the cost of replacing old fleets and gave Pakistan greater freedom to integrate Chinese and locally developed weapons.

Block I established the aircraft in service. Block II improved production maturity, fuel capacity and weapon integration. The twin-seat JF-17B supported conversion training and offered additional development possibilities. Block III introduced an AESA radar, improved electronic warfare, a modern cockpit and compatibility with long-range Chinese air-to-air weapons. The programme demonstrated the value of spiral development: each block delivered usable capability while the industrial system learned.

The JF-17 is not a direct substitute for every role of a Rafale, Su-30MKI or F-16. It is smaller, carries less fuel and has limits in payload, radar aperture and growth margin. Its strategic logic is affordability, availability and network integration. A large number of reasonably modern fighters can perform air defence, strike and maritime missions while allowing expensive high-end platforms to be concentrated on the most demanding tasks.

A rivalry shaped by unequal scale and different institutional answers

The enduring asymmetry is simple: India has always possessed the larger demographic, economic and industrial base, while Pakistan has had to design military effectiveness around scarcity. This did not produce a permanently superior force on either side. It produced different optimisation problems. India could sustain a broad inventory,

multiple suppliers and large geographic coverage. Pakistan had stronger incentives to concentrate its best aircraft, standardise procedures, keep decision chains short and preserve a higher proportion of the fleet for the principal eastern threat.

The distinction helps explain why simple inventory tables repeatedly mislead. India may own more aircraft and more types, but every additional type creates training, weapons, software, maintenance and supply-chain requirements. Pakistan has fewer resources and less attrition tolerance, yet a narrower threat model makes it easier to design exercises and command arrangements around a specific opponent. The PAF's institutional reputation has therefore rested on preparation, centralised air-defence control, demanding pilot standards and selective acquisition of force multipliers rather than on matching India platform for platform.

Generation-by-generation comparison

The first jet generation was dominated by aerodynamic performance, guns and basic radar control. The second added supersonic speed, radar-guided interception and early missiles, but reliability and rules of engagement limited theoretical advantages. The third generation brought better radars, all-aspect missiles and specialised strike aircraft. The fourth generation made look-down/shoot-down radar, pulse-Doppler tracking, digital navigation and modern electronic warfare central. The 4.5-generation period added AESA radar, high-off-boresight missiles, networked sensors, precision stand-off weapons and improved self-protection. Fifth-generation capability is not defined by shape alone: it combines low observability, internal weapons, sensor fusion, secure connectivity, mission-data quality and the ability to operate inside a contested electromagnetic environment.

Pakistan's procurement pattern moved from U.S. equipment to a mixed U.S.-Chinese structure, with the JF-17 creating a domestic integration and production base. India's pattern moved from British and French aircraft to a large Soviet/Russian core, then added French, Israeli and indigenous systems. Pakistan's route generally produced fewer major fighter families and stronger dependence on China; India's route produced greater strategic choice but a heavier integration burden.

The procurement lesson before 2019

By the late 2010s, both air forces understood that the decisive gap was no longer merely aircraft performance. Airborne early warning, secure data exchange, electronic support, long-range weapons and command discipline determined whether an aircraft could exploit its sensors. Pakistan invested in Saab 2000 Erieye and ZDK-03 fleets, JF-17 development and links among dissimilar platforms. India fielded Phalcon and Netra airborne warning, Su-30MKI mass, Mirage 2000 upgrades and an expanding ground-based network. The February 2019 crisis exposed how much work remained on both sides.

The inheritance of 1947 and the logic of asymmetry

At independence, the two air forces inherited radically different strategic problems. India possessed the larger population, territory and industrial base, but also had to cover a far wider geographic arc. Pakistan began with fewer airfields, fewer aircraft and little domestic aerospace capacity. That imbalance encouraged two durable Pakistani habits: concentrating scarce high-quality assets at decisive points and treating training, maintenance and command discipline as substitutes for numerical depth. India, by contrast, gradually built a force intended to sustain operations across multiple theatres and to support an expanding range of national objectives. Neither model was inherently superior; each was adapted to a different scale of state and threat.

The wars of 1965 and 1971 reinforced competing institutional memories. Pakistan remembered tactical proficiency, aggressive interception and the value of a compact professional force. India remembered the need for mass, geographic depth and joint operations, especially after the decisive strategic result of 1971. These memories later shaped procurement. Pakistan repeatedly sought a limited number of technologically advanced fighters, supported by training and centralised battle management. India acquired larger fleets from multiple suppliers and invested in a broader national aerospace structure. The rivalry therefore evolved not merely as an aircraft contest but as a contest between concentration and scale.

Sanctions, diversification and the creation of the JF-17 pathway

The F-16 transformed Pakistan's air-defence capability during the 1980s, but the Pressler-era suspension of aircraft and support exposed the political risk of depending on a single external supplier. Pakistan responded by extending Mirage service lives, deepening cooperation with China and preserving technical skills through local overhaul. The JF-17 programme emerged from this experience. Its strategic importance lies less in any single performance figure than in Pakistan's ability to assemble, modify, sustain and progressively upgrade a combat aircraft under national control.

India followed a different path. Soviet and later Russian aircraft supplied mass and heavy-fighter capability, while French platforms offered specialised strike and electronic-warfare advantages. Indigenous programmes sought to reduce dependence but faced the familiar difficulties of engine supply, certification, production tempo and requirements growth. By the 2020s, India possessed a much larger and more diverse force, yet diversity imposed integration and sustainment costs. Pakistan possessed less depth, but its Chinese-origin systems increasingly arrived as connected families of radar, missile, data-link and fighter technologies. This contrast is central to the 2026 baseline.

From platform comparison to system comparison

Earlier generations could often be discussed through speed, climb rate, turn performance and weapon load. Those measures remain relevant, but the decisive unit of analysis is now the combat system. A fighter's effectiveness depends on the quality of the track it receives, the reliability of its data links, the rules governing emissions, the missile's energy at intercept, the availability of electronic support and the commander's ability to allocate weapons. The shift from isolated platforms to networks helps explain why a smaller force can create a local advantage without overturning the larger structural balance.

For Pakistan, the central question has become whether it can preserve a coherent sensor-to-shooter chain under attack. For India, the central question is whether it can convert its greater inventory, geography and industrial potential into a unified operational picture across heterogeneous fleets. The 2019 and 2025 crises provide evidence for both propositions: Pakistani preparation and package coherence could produce disproportionate early effects, while Indian adaptation and strategic depth limited the possibility of a decisive Pakistani advantage.

Chapter source notes

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CHAPTER 02

The 2019 Crisis: Balakot and Operation Swift Retort

How a limited strike became an air battle under the nuclear shadow - and why Pakistan restored deterrence.

CHAPTER ARGUMENT

Pakistan's response was significant because it was neither passive absorption nor uncontrolled escalation. It demonstrated the ability to assemble a package, cross a political threshold, release weapons near military targets and retain space for termination. The captured Indian pilot gave Pakistan a visible tactical success, but the more durable result was restoration of the belief that attacks inside Pakistan would produce a measured military response.

KEY THEMES calibration | deterrence | package coherence

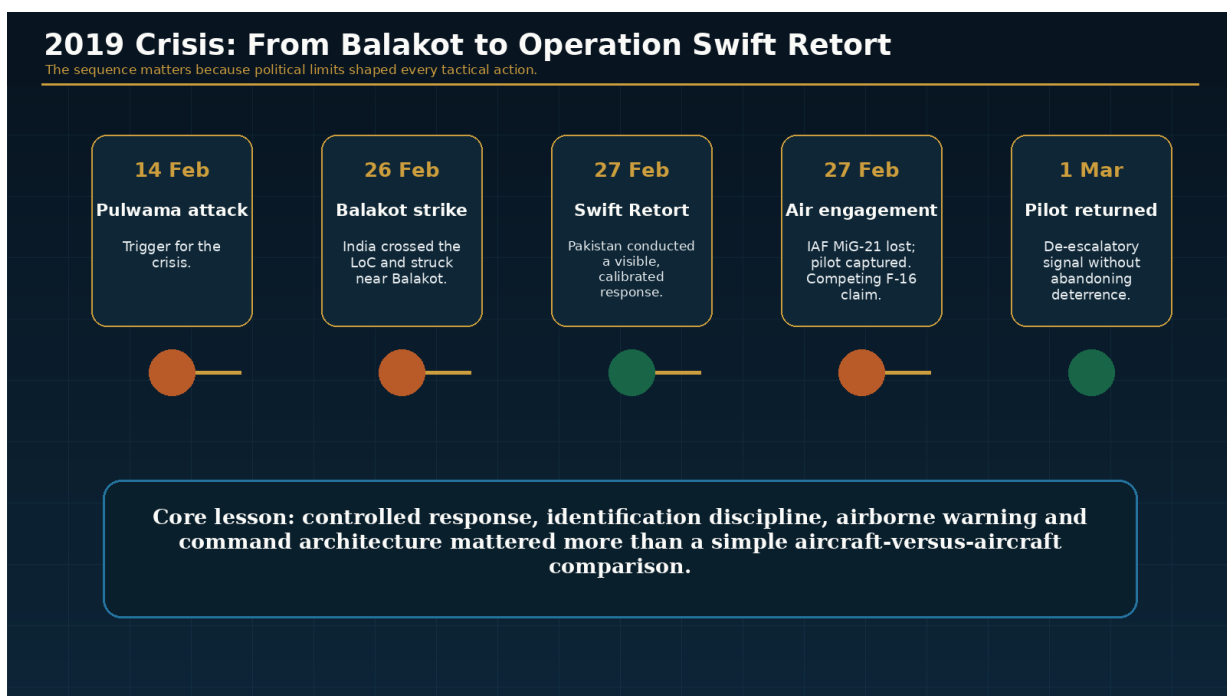


Figure 2.1. The 2019 sequence. Operation Swift Retort is best understood as a calibrated restoration of deterrence rather than a simple aircraft duel.

The crisis as a systems test

Balakot did not offer a clean laboratory comparison of Mirage 2000, F-16 or JF-17 performance. The aircraft operated under political restrictions, uncertain identification, ground-control direction, airborne warning support and rapidly changing rules of engagement. The event therefore tested decision architecture as much as hardware.

The friendly-fire destruction of an Indian Mi-17 was strategically important because it exposed the danger created by compressed warning time, imperfect identification and multiple agencies operating under crisis conditions. The lesson is directly relevant to later drone and cruise-missile defence: a faster network is useful only when track correlation and identification remain disciplined.

Both countries drew lessons that encouraged longer-range missiles, better airborne warning, stronger electronic support and tighter data-link integration. The acquisitions that became visible after 2019 - Rafale and Meteor on the Indian side, and J-10CE, PL-15 and JF-17 Block III on the Pakistani side - should be read as parts of competing systems rather than independent shopping decisions.

The Pulwama attack and India's Balakot strike created the first direct air exchange between the two states in decades. India presented Balakot as a counter-terrorism strike beyond the Line of Control, intended to establish that nuclear deterrence did not prevent limited conventional action. Pakistan disputed the damage and responded the following day with a controlled strike package against targets in Indian-administered Kashmir, describing the action as a demonstration rather than an attempt to cause mass casualties.

The air engagement that followed produced enduring controversy. India lost a MiG-21 Bison and its pilot was captured and later returned. An Indian Mi-17 helicopter was also destroyed by friendly fire, demonstrating how confusion and identification failure can be as dangerous as enemy action. India claimed that an F-16 was shot down; Pakistan denied the claim. Publicly available evidence did not resolve every detail, and later discussions of US aircraft counts were often presented more conclusively than the underlying reporting justified.

The crisis revealed weaknesses on both sides. India possessed powerful aircraft and missiles but faced challenges in command, identification and coordination. Pakistan demonstrated the ability to assemble a package involving F-16s, JF-17s, Mirages and airborne warning, but it also had to manage the risk of escalation and avoid exposing the entire force. The event accelerated Indian interest in longer-range air-to-air missiles, networked control and additional Rafales and S-400 systems. Pakistan accelerated J-10CE acquisition, JF-17 Block III and air-defence modernisation.

Strategically, both sides claimed victory because they measured different outcomes. India argued that it had broken a taboo by striking beyond the Line of Control. Pakistan argued that it had restored deterrence by responding visibly and capturing an Indian pilot. The crisis therefore changed expectations without resolving the underlying rivalry.

The February 2019 crisis marked a transition from deterrence based mainly on mobilisation to deterrence conducted through limited precision air action. India struck near Balakot after the Pulwama attack, presenting the operation as a counter-terrorist action rather than an attack on the Pakistani state. Pakistan responded the next day with a deliberately visible operation against military areas, followed by an aerial engagement in which an Indian MiG-21 was lost and its pilot captured. India also lost a Mi-17 helicopter to friendly fire during the crisis, illustrating how compressed decision time can produce lethal identification failure.

The competing F-16 claims remain instructive. India stated that a Pakistani F-16 had been shot down; Pakistan denied the loss, and later reporting did not establish a missing aircraft. The episode shows why missile fragments, electronic records and public statements must be evaluated together. It also shows how quickly a tactical claim becomes part of national political legitimacy. For analysts, the correct conclusion is not that every official statement is false, but that wartime certainty must be earned through converging evidence.

Institutionally, Pakistan concluded that it required greater long-range BVR reach, better electronic surveillance and a larger capacity to coordinate multiple fighter types. India concluded that it needed improved BVR weapons, stronger network integration, more robust identification and faster decision-making. Rafale, Meteor, J-10CE, PL-15, new radars and data links were all interpreted through the memory of 2019. The crisis therefore became the immediate doctrinal bridge to the much larger networked engagement of May 2025.

Post-2019 corrective priorities

Why Swift Retort mattered strategically

Pakistan's response was significant because it was neither passive absorption nor uncontrolled escalation. It demonstrated the ability to assemble a package, cross a political threshold, release weapons near military targets and retain space for termination. The captured Indian pilot gave Pakistan a visible tactical success, but the more durable result was restoration of the belief that attacks inside Pakistan would produce a measured military response.

This is the strongest part of the Pakistani narrative: deterrence was restored through action that was calibrated rather than indiscriminate. It does not require every Pakistani wartime claim to be accepted. The confirmed loss of the MiG-21, the capture and return of its pilot, and the unresolved nature of India's F-16 claim are sufficient to show that India did not obtain a cost-free new normal. Reuters later reported that a U.S. count found no missing Pakistani F-16, although public discussion of the count remained politically contested.[9]

The package, not the individual fighter

The operation is often reduced to an F-16 versus MiG-21 story. That is analytically incomplete. Mirage strike aircraft, fighter escorts, combat air patrols, ground controllers, airborne warning, electronic surveillance and political command all contributed. The PAF's principal success was package coherence. Aircraft with different origins could participate in one timed plan because the force had rehearsed common procedures and because commanders understood the political purpose of the mission.

India possessed more powerful individual platforms than the MiG-21 involved in the loss. Its difficulty was converting the full force into a common, reliable picture during a compressed crisis. The friendly-fire loss of an Mi-17 reinforced the point: speed without disciplined identification can turn a network into a source of danger.

What each side changed after 2019

India accelerated Rafale and Meteor induction, strengthened S-400 deployment, expanded indigenous radar and missile programmes and placed greater emphasis on stand-off precision. Pakistan inducted J-10CE, continued JF-17 Block III, deepened long-range BVR integration and treated airborne warning and data links as central combat systems. The May 2025 battle should therefore be understood as a rematch between two forces that had spent six years correcting the weaknesses exposed in 2019.

Balakot as a political-military signal

India's 26 February 2019 strike was designed to demonstrate that a terrorist attack could be answered by air power beyond the Line of Control. The political significance was greater than the physical scale of the raid. India sought to establish a new threshold for punitive action while limiting escalation. Pakistan therefore faced a difficult problem: it had to restore deterrence without appearing to initiate uncontrolled war. A purely verbal response would have accepted India's new precedent; an indiscriminate strike could have widened the conflict.

Operation Swift Retort was constructed around this political requirement. Pakistan announced and demonstrated the ability to strike military targets while deliberately controlling the selection and timing of aim points. The operation combined aircraft, airborne warning, electronic support and a visible air battle. Its most important result was not a claim about one missile or one fighter type. It was the restoration of reciprocal risk: India could cross the established threshold, but Pakistan could answer in a manner that imposed military and political costs.

The aerial engagement and the evidentiary record

The publicly established core of the engagement is comparatively clear. An Indian MiG-21 Bison was lost, its pilot was captured in Pakistan and later returned. India asserted that the pilot had shot down a Pakistani F-16. Pakistan denied losing an F-16, and subsequent reporting on a United States count did not support the Indian claim. The episode illustrates why official wartime statements must be separated from evidence. It is possible to recognise India's willingness to pursue Pakistani aircraft while also concluding that the claimed F-16 kill was not established in the available record.

From an operational perspective, the engagement highlighted the importance of situational awareness and force-package discipline. A fighter crossing a defended boundary without complete support can become isolated even when its pilot acts aggressively. Pakistan's stronger result came from controlling the geometry of the wider package rather than from a simple one-versus-one duel. The release of the Indian pilot then converted a tactical success into a controlled de-escalatory message.

Lessons carried into 2025

The 2019 crisis produced lessons on both sides. Pakistan reinforced the value of airborne warning, centralised control, electronic support and calibrated targeting. India accelerated interest in longer-range weapons, improved

networking, hardened bases and more credible stand-off options. Yet procurement does not immediately become operational practice. New missiles and radars require tactics, mission data, training and command procedures before they change outcomes.

The enduring Pakistani lesson was that a smaller force could not afford fragmented operations. Every component had to contribute to a common plan. The enduring Indian lesson was that numerical superiority did not automatically prevent local surprise or tactical loss. By 2025, both forces had more capable weapons, but the organisational lessons of 2019 remained at least as important as the hardware acquired after it.

ASSESSMENT

The confirmed Pakistani achievement in 2019 is strong enough without exaggeration: a visible retaliatory package, an Indian fighter loss and captured pilot, followed by a de-escalatory return of the pilot. India's F-16 kill claim was not established by the later U.S.-count reporting.

Chapter source notes

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CHAPTER 03

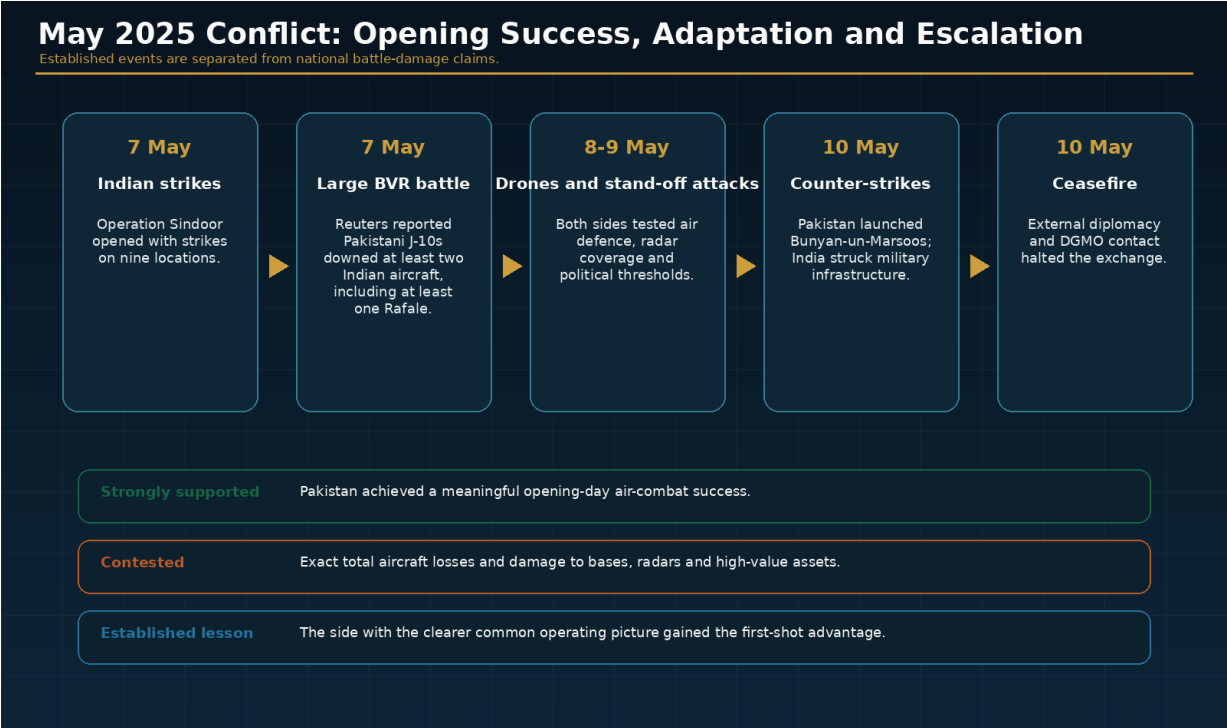
The May 2025 Conflict

Opening-day BVR success, adaptation, stand-off attacks, drones, air defence and contested battle-damage claims.

CHAPTER ARGUMENT

The most credible public evidence supports a Pakistani opening-day air-combat success. Reuters reported that U.S. officials assessed Pakistani J-10 fighters had brought down at least two Indian military aircraft, including at least one Rafale.[1] Later reporting reconstructed a Pakistani kill chain in which airborne and ground surveillance, Data Link 17, controlled fighter emissions and long-range PL-15 employment created superior situational awareness.[2] France's air chief and a Dassault executive were also reported as acknowledging evidence of a Rafale loss, although India did not publicly provide a complete loss list.

KEY THEMES BVR | adaptation | evidence



India subsequently changed tactics and employed deep standoff weapons against Pakistani military infrastructure. Pakistan also conducted retaliatory operations. Claims about destroyed S-400 batteries, numerous parked aircraft, airborne-warning losses and exact damage at individual bases remain disputed. The book therefore treats the conflict as an adaptation cycle, not as a single aircraft beauty contest.

Evidence discipline

An aircraft wreckage image can establish that an aircraft was lost, but not automatically identify the weapon, launch range or complete kill chain. Radar tracks can support a claim but remain vulnerable to selective release. Commercial satellite imagery can show structural damage yet may miss temporary systems, decoys or repaired runways. Official statements are necessary sources, but they are also instruments of deterrence and domestic legitimacy.

The strongest conclusion is deliberately narrow: Pakistan appears to have generated a better opening BVR picture and imposed real losses; India retained the ability to adapt and strike at depth; both air forces survived; and the risk of horizontal escalation increased as bases, command nodes and long-range systems became targets.

The May 2025 conflict was the most serious India-Pakistan military escalation in decades. India launched strikes on May 7 against sites it described as terrorist infrastructure after the Pahalgam attack. Pakistan denied responsibility for the attack and responded through air operations, artillery, drones and later strikes against Indian military targets. Both sides conducted extensive information campaigns, and many public claims remain unresolved.

Several points are strongly supported. Reuters cited US officials who assessed that Pakistani J-10 aircraft shot down at least two Indian aircraft, including at least one Rafale. Indian officials acknowledged initial aircraft losses without confirming Pakistan's total or identifying every type. France's air chief later said he had seen evidence of three Indian fighter losses, including a Rafale and a Sukhoi. These findings do not validate every Pakistani claim, but they establish that the initial air battle imposed real costs on India.

The best-supported explanation focuses on the kill chain rather than a simplistic J-10-versus-Rafale verdict. Reuters' August 2025 reconstruction described a Pakistani network linking air, land and space sensors through Data Link 17, including feeds from a Swedish-origin surveillance aircraft. Pakistani fighters could receive off-board information and manage radar emissions, while the long-range PL-15 created an engagement geometry Indian crews had not expected. RUSI and Air & Space Forces analysts similarly stressed situational awareness, intelligence and tactics.

India adapted after the opening losses. Its chief of defence staff stated that tactics were corrected and that Indian forces subsequently struck Pakistani air bases and other military sites. India reported using a range of standoff weapons, including BrahMos. Pakistani accounts acknowledged that Indian weapons reached several bases and caused damage, though the scale remains disputed. Pakistan then launched Operation Bunyan-un-Marsoos and claimed strikes on Indian bases, missile facilities and air-defence elements. India acknowledged impacts at some sites but rejected Pakistani claims of major destruction.

India's later claim that it destroyed six Pakistani aircraft is contested and was denied by Pakistan. Public evidence is insufficient to accept the full claim as established. Equally, claims that Pakistan destroyed complete S-400 batteries or numerous aircraft on the ground lack conclusive independent proof. A balanced account therefore recognises a Pakistani advantage in the initial long-range air engagement, an Indian ability to adapt and conduct deep standoff strikes, and a wider conflict in which battle-damage claims remain politically charged.

The strategic result was not conquest or the collapse of either air force. Both sides demonstrated that they could strike valuable targets while attempting to remain below the nuclear threshold. The rapid ceasefire reflected the danger that standoff precision and networked systems could accelerate escalation faster than traditional crisis diplomacy.

The May 2025 conflict was unusually important because it produced a modern air battle without a prolonged attempt to invade or occupy territory. Both sides used aircraft, missiles, drones, air defence, electronic warfare and information operations while managing escalation between nuclear-armed states. Reuters later reported that approximately 110 aircraft were involved in the opening air battle and that Pakistani forces used airborne warning and data links to construct a broader picture. US officials assessed that Pakistani J-10 aircraft brought down at

least two Indian fighters, including at least one Rafale. India acknowledged initial aircraft losses without publicly specifying the number at that stage.

The exact loss balance remains contested. Pakistani officials claimed several Indian fighters; French and Western assessments supported the loss of multiple Indian aircraft but did not validate every Pakistani claim. India later claimed that it had destroyed Pakistani aircraft, including high-value platforms; Pakistan denied the claim, and publicly available evidence remains incomplete. The responsible conclusion is therefore narrower than either national narrative: Pakistan achieved a significant opening air-to-air success; India then modified tactics and conducted further strikes; neither side has publicly released a complete independently verifiable battle record.

The operational innovation was the separation of sensing, shooting and guidance. A fighter that launches a missile need not be the platform that first detected or continuously tracked the target. Airborne warning aircraft, ground sensors and other fighters can contribute to a shared track, while the shooter limits its own emissions. This reduces warning time and complicates defensive electronic support. It also means that the quality of links, track correlation and command discipline may matter more than the theoretical radar range of the launching aircraft.

India's adaptation is equally important. Senior Indian military statements indicated that tactics were changed after the initial losses and that later operations were regarded as successful. A professional assessment must account for learning by both sides. Pakistan cannot assume that a 2025 method will remain surprising in the next crisis; India will train specifically against off-board targeting and long-range missile tactics. Conversely, India cannot assume that purchasing additional Rafales or S-400 systems alone will solve a network problem. The contest after 2025 is a race in countermeasures, deception, distributed sensing and resilient command.

Part II - Forces, Doctrine and Procurement

How fighters, missiles, airborne warning, air defence, industry and training form competing air-power systems.

Evidence grading of major May 2025 claims

What is established

The most credible public evidence supports a Pakistani opening-day air-combat success. Reuters reported that U.S. officials assessed Pakistani J-10 fighters had brought down at least two Indian military aircraft, including at least one Rafale.[1] Later reporting reconstructed a Pakistani kill chain in which airborne and ground surveillance, Data Link 17, controlled fighter emissions and long-range PL-15 employment created superior situational awareness.[2] France's air chief and a Dassault executive were also reported as acknowledging evidence of a Rafale loss, although India did not publicly provide a complete loss list.

This matters because it confirms more than a lucky close-range engagement. The reported engagement involved large formations, long distances, electronic-warfare activity and fighters remaining mainly within their own airspace. It demonstrated that a smaller air force could combine Chinese, Swedish and Pakistani-origin systems into an operational picture capable of creating a first-shot opportunity against a premium Western-equipped formation.

What remains contested

Pakistan's larger claims concerning the exact number and type of Indian aircraft destroyed remain disputed. India's later claims that it destroyed several Pakistani aircraft and a high-value airborne platform were rejected by Pakistan and have not been independently established to the same standard.[4] Claims about destruction of S-400 components, BrahMos storage, specific radars, command posts and extensive base damage also vary sharply between national accounts.

The correct method is asymmetrical confidence, not false equivalence. Evidence for at least two Indian aircraft losses is stronger than evidence for the full Pakistani claimed total. Evidence for Indian later strikes on Pakistani military infrastructure is stronger than evidence for every Indian claimed aircraft kill. A serious book can recognise a Pakistani opening success without converting all wartime statements into fact.

The adaptation phase

The opening engagement did not freeze the balance. Indian commanders changed tactics, widened military target sets and employed BrahMos and other stand-off weapons against Pakistani air bases and radar-related infrastructure. Reuters reported Indian and Pakistani officials describing repeated BrahMos penetration and a strike against a surveillance aircraft in a hangar, although the exact damage remained unclear.[2][3] India therefore demonstrated resilience and the ability to learn after an initial intelligence and tactical failure.

Pakistan's counter-strikes on 10 May showed that it retained the ability to respond across a broad target set. The conflict ended before either side could prove sustained air superiority. Operationally, Pakistan achieved the more consequential opening result; strategically, both sides retained enough capability to deny the other a decisive conclusion. The rapid ceasefire reflected the danger that further strikes on bases and command systems could create pressure for horizontal or nuclear escalation.

The central lesson of May 2025

The lesson is not that J-10CE is universally superior to Rafale. It is that the aircraft operating inside the better-informed and better-prepared system can defeat a theoretically stronger opponent. Missile-range assumptions, track quality, emission control, target prioritisation and command speed produced the opportunity. Platform quality still mattered - an AESA-equipped fighter and modern active-radar missile were necessary - but the network turned capability into effect.

The opening BVR battle as a contest of awareness

The first phase of the May 2025 conflict demonstrated how modern air combat can be decided before opposing pilots see one another. Credible open-source reporting indicates that Pakistan achieved a significant opening-day BVR success and that at least one Rafale was lost. The exact loss total remains contested, but the operational lesson does not depend on accepting the highest Pakistani claim. Indian aircraft entered an engagement environment in which Pakistani fighters, airborne warning and long-range missiles were combined more effectively than Indian planners had expected.

The likely advantage was created by several interacting factors: a prepared defensive posture, favourable geography, disciplined emission control, offboard tracks and the reach of the PL-15 family. A long-range missile is not independently decisive. It requires a sufficiently accurate track, a launch position that preserves energy and updates that keep the missile's predicted intercept basket valid. Pakistan's system appears to have compressed the time between detection, classification, decision and launch. This created first-shot opportunities and forced Indian formations to react defensively.

Indian adaptation and the transition to stand-off warfare

India did not remain tactically static. Indian officials later acknowledged initial aircraft losses and said that tactics changed. As the confrontation continued, both sides increasingly relied on stand-off weapons, drones and attacks against military infrastructure rather than attempting unrestricted fighter penetration. This adaptation matters because it shows the limits of judging a conflict from the opening engagement alone. Pakistan may have held the more coherent initial air-combat picture, while India retained multiple pathways for applying pressure through depth, scale and diverse weapon inventories.

The campaign therefore moved from a fighter-centric contest toward a broader duel between integrated air defence, precision strike, electronic warfare and base resilience. The ability to keep runways, radars, command posts and communications functioning became as important as the performance of any aircraft. This transition is a preview of the 2026-2036 environment, in which drones and stand-off weapons will increase the number of simultaneous threats presented to air-defence networks.

Claims, physical evidence and strategic meaning

Both governments presented the conflict through national narratives. Pakistan emphasised successful interceptions and retaliatory strikes; India emphasised the scale and accuracy of Operation Sindoor and later claimed Pakistani aircraft losses. Open sources support some claims more strongly than others. Aircraft wreckage,

official acknowledgement, satellite imagery and converging independent reporting deserve greater weight than unattributed social-media posts or numerical claims issued during the crisis.

A disciplined Pakistani account does not require treating every claim as proven. The strategic conclusion is already substantial: Pakistan prevented India from conducting a cost-free punitive air operation, demonstrated the combat relevance of its Chinese-origin network and forced rapid Indian tactical adaptation. India's strategic conclusion is also substantial: it demonstrated the willingness and capacity to strike across an expanded target set and to continue operations after initial losses. The conflict ended without either side converting tactical success into uncontested air superiority.

EVIDENCE JUDGEMENT

Strongly supported: Pakistan achieved a meaningful opening-day BVR success and at least one Rafale was lost. Contested: the complete loss totals and many claims concerning specific bases, radars and support aircraft.

Chapter source notes

- [1] **Reuters.** Pakistan's Chinese-made jet brought down two Indian fighter aircraft, U.S. officials say. 8 May 2025. [Source](#)
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CHAPTER 04

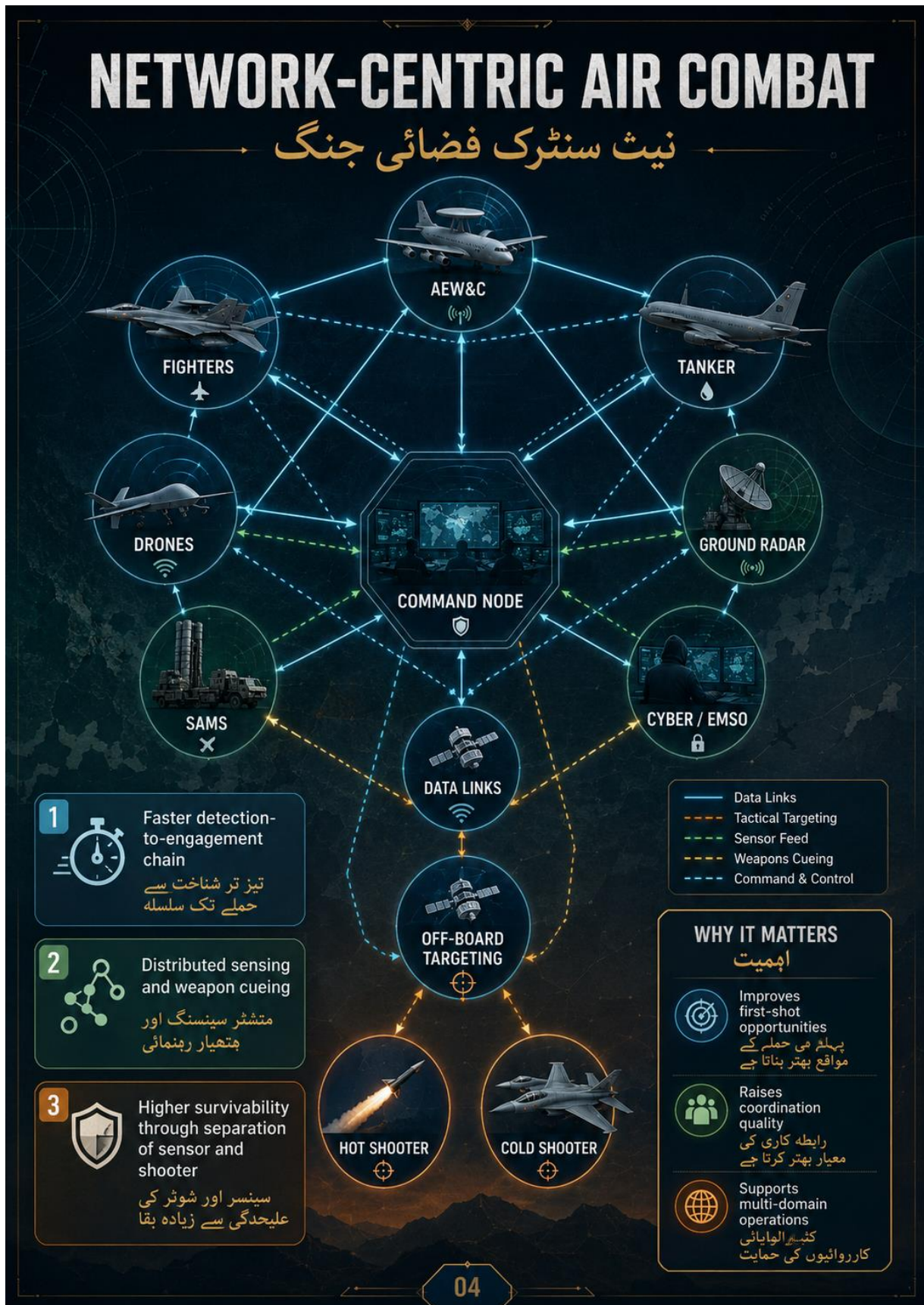
How Modern Air War Works

Kill chains, data links, command culture, identification and the battle for decision advantage.

CHAPTER ARGUMENT

A modern engagement begins before a fighter sees a target. Sensors detect emissions or radar returns; operators correlate tracks; intelligence and rules of engagement determine identity; a commander assigns a shooter; the shooter receives a target-quality update; the weapon is launched; mid-course guidance keeps the missile inside a useful intercept basket; and post-shot assessment decides whether another weapon is required. Each stage can fail independently.

KEY THEMES sensors | data | command



Visual Plate II. Network-centric air combat as a system of sensors, command nodes, shooters and support assets. Conceptual illustration, not operational planning data.

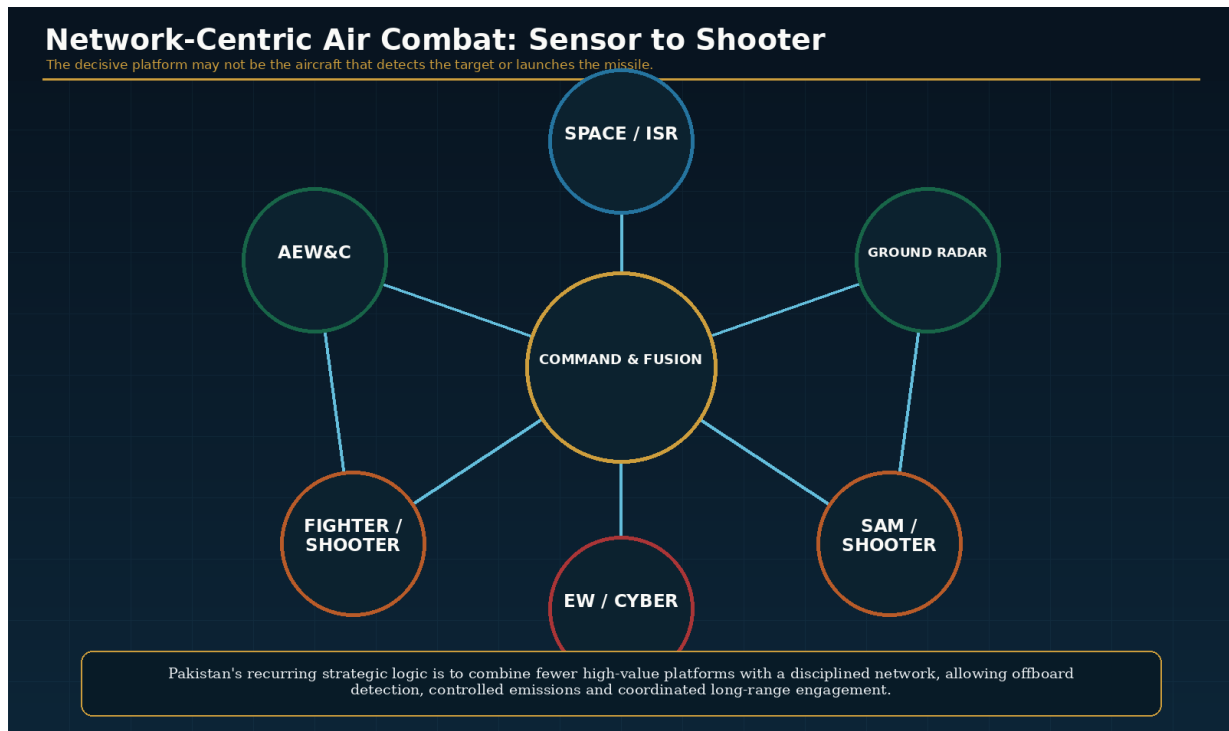


Figure 4.1. A notional sensor-to-shooter chain. The sensor, commander and shooter can be separate platforms if timing, identity and track quality are maintained.

From platform-centric warfare to a distributed kill chain

A modern air engagement can be divided into six functions: detect, classify, identify, decide, assign and engage. These functions may be performed by different nodes. A ground radar may detect; an AEW&C aircraft may correlate; a command node may assign; a fighter may launch; and another sensor may provide the most useful track update.

The benefit is not merely longer detection range. Distribution allows the shooter to preserve its own emissions, complicates enemy targeting and creates redundancy. The cost is dependence on secure timing, encryption, message standards, track quality and disciplined command. A network that produces duplicate or stale tracks can accelerate the wrong decision.

Pakistan's force-design logic seeks concentrated operational density: relatively limited fighter numbers supported by airborne warning, ground radar, secure links, electronic warfare and surface-to-air missiles. India's design has greater scale, geographic depth and mission diversity, but must integrate a wider mixture of Russian, French, Israeli, indigenous and Western-origin systems.

Data links are not magic

A tactical data link does not transmit perfect reality. It sends messages derived from sensors with uncertainty, update rates and latency. Track quality depends on geometry, time synchronisation, identification logic and resistance to jamming. The receiving fighter still needs rules for whether it trusts, fuses or rejects the remote track.

Link 16, national links and proprietary networks can coexist, but gateways introduce security and translation problems. The decisive question is not whether a country possesses a named link; it is whether the force can maintain a coherent picture while nodes move, emissions are restricted and adversaries jam, deceive or physically attack the network.

Pakistan's force-design logic

Pakistan's central problem is how to maintain credible air denial against a much larger state while operating under severe fiscal constraints. The answer has been to build a force in layers. The JF-17 provides the affordable backbone; F-16s remain valuable for mature training, weapons and high-end missions; J-10CEs add a modern radar, electronic warfare and long-range missile platform; Mirages continue specialised strike roles while they are

gradually replaced. Airborne warning, ground radars, data links, electronic warfare and surface-to-air missiles are intended to make these aircraft function as a network rather than separate fleets.

This model explains why apparently small inductions can matter. A new radar, a secure link, an electronic-support aircraft, a drone unit or a satellite service may improve the performance of every connected fighter. Pakistan's official exercise messaging increasingly describes a common operating picture, integrated air defence, space support, cyber operations and electromagnetic-spectrum management. Public claims should not be accepted uncritically, but the doctrine is clear: shorten the detection-to-engagement chain and separate the sensor from the shooter.

The model also reduces reliance on a single political supplier. China provides the main growth pathway, including JF-17, J-10CE, missiles, radars and air-defence systems. The United States remains important for F-16 sustainment and Link 16-related interoperability within the F-16 fleet. Sweden supplied Erieye AEW&C. Turkey offers drones, electronic systems and possible collaboration connected with KAAN and unmanned combat aircraft. Pakistan seeks to integrate these sources through its own command architecture.

The vulnerabilities are substantial. A smaller force is more sensitive to aircraft losses, runway damage and the destruction of airborne warning or tanker assets. Chinese dependence may replace rather than eliminate foreign dependence. Network-centric warfare creates cyber, electronic and supply-chain attack surfaces. Pakistan's economic constraints also limit stockpiles, flying hours and the speed of replacing losses. The model is therefore optimised for deterrence and a short high-intensity contest, not an unlimited war of attrition.

Pakistan's modernisation is best understood as a search for operational density rather than simple platform parity. Because it cannot match India aircraft for aircraft or rupee for rupee, it seeks to increase the number of useful relationships among sensors, weapons and command nodes. A new radar, secure link, loitering munition or electronic-support unit may create more effect than a small number of premium aircraft if it improves the entire force's ability to detect, decide and engage.

This model has three advantages. It allows frequent capability insertion, makes use of Pakistan's concentrated threat environment and can exploit Chinese systems designed for networked operations. It also fits a service culture in which central planning and exercises are used to standardise tactics across a relatively small force. The weakness is dependence on network integrity. If links are jammed, cyber systems are compromised or airborne warning aircraft are forced away, the effectiveness of distributed shooters can fall sharply.

The model also depends on disciplined prioritisation. A smaller air force cannot fund every desirable platform. It must decide whether the next unit of spending produces greater value in fighters, missiles, shelters, runway repair, airborne warning, drones or electronic warfare. Pakistan's experience suggests a preference for capability packages rather than isolated purchases, but the public record does not prove that every announced command or system is fully integrated. The distinction between organisational aspiration and demonstrated operational maturity remains essential.

India's force-design logic

India's air force is designed for more than a Pakistan contingency. It must consider the long Himalayan frontier with China, the Indian Ocean, strategic transport, nuclear delivery, air defence of a continental state and support to the army and navy. This creates a requirement for greater numbers, range, infrastructure and specialised aircraft. It also means that not every IAF squadron can be concentrated against Pakistan without accepting risk elsewhere.

The IAF's combat fleet combines Su-30MKI, Rafale, Mirage 2000, MiG-29, Jaguar and Tejas families. This diversity provides multiple weapons, sensors and mission options, but it increases the burden of maintenance, software integration and data sharing. The Su-30MKI offers range and payload; Rafale provides a modern sensor, electronic-warfare and weapons package; Mirage 2000 remains a valued precision platform; Tejas is intended to replace ageing light fighters and build indigenous capacity.

India has also invested in S-400, indigenous Akash systems, the Integrated Air Command and Control System, Netra and Phalcon airborne warning, BrahMos and Astra missiles, and a growing space and drone ecosystem. These are not isolated prestige purchases. If effectively connected, they can create a dense defensive and

offensive network. The challenge is integration across Russian, French, Israeli, Indian and American-origin systems, each with different security restrictions and data standards.

The IAF's numerical shortfall is serious. IISS assessed 29 fighter/ground-attack and ground-attack squadrons in early 2026, below the long-standing authorised figure of 42. Retirements occurred faster than replacement. India's advantage is that its economic and industrial base can eventually reverse the decline. Its risk is that lengthy procurement, engine dependence and production delays may create a capability trough during the late 2020s.

India's force-design problem is broader than the Pakistan front. The IAF must consider China, maritime approaches, strategic transport, island territories and support to land forces across a vast geography. This drives demand for heavy fighters, tankers, airborne warning, long-range missiles and a larger squadron structure. It also makes simple numerical comparison with Pakistan misleading: not every Indian squadron can be concentrated on the western front without accepting risk elsewhere.

Diversity provides diplomatic and technical flexibility. India can access French electronic warfare and weapons, Russian airframes and missiles, Israeli sensors, American engines and indigenous systems. The same diversity complicates interoperability, spares, software certification and training. A mixed force can be highly effective when a common command architecture translates among systems, but it can become inefficient if each fleet operates as a separate island.

The two-front requirement increases the value of indigenous capacity because foreign suppliers may face political or wartime limitations. Tejas, Astra, Akash, indigenous radars and the AMCA programme are therefore strategic projects even when foreign content remains. India's central challenge is not a shortage of technological ambition but the conversion of prototypes and approvals into reliable production. Its larger economy creates potential power; delivery discipline determines how much of that potential appears on the flight line.

Training and command culture

Pilot quality is often discussed in nationalistic terms, but there is no reliable public metric that proves one air force's pilots are universally superior. Training effectiveness depends on annual flying hours, simulator quality, adversary replication, instructor standards, exercise realism, maintenance availability and the ability to learn after failure. A highly trained pilot operating with incomplete information may still lose to an average pilot supported by a better network.

The PAF benefits from a focused primary threat and a relatively compact force. Its exercises can repeatedly rehearse the geography, timing and likely mission sets of an India contingency. It has historically placed high value on weapons-school culture, centralised battle management and the selection of experienced pilots for new platforms. The reported movement of experienced F-16 personnel into J-10 units would be consistent with this institutional logic, though detailed personnel assignments are not publicly verifiable.

The IAF trains for a wider range of missions and participates in major international exercises with Western, Russian and regional air forces. This exposure can improve interoperability, complex package planning and tactical adaptation. Its challenge is sustaining common standards across a larger fleet and several aircraft types while managing high operational commitments and ageing platforms.

The 2025 conflict illustrates the importance of learning speed. Indian leadership acknowledged initial losses and stated that tactics were changed. Pakistan's opening success created useful lessons but also risks overconfidence if national narratives treat one engagement as permanent proof of superiority. The side that institutionalises uncomfortable lessons will gain more than the side that merely celebrates favourable claims.

Training is difficult to measure from open sources because sortie rates, exercise results and mission qualification standards are usually classified. Public exercise participation nevertheless reveals priorities. Pakistan repeatedly emphasises integrated air-defence exercises, dissimilar air combat, electronic warfare and centralised battle management. India exercises across a wider range of partners and gains exposure to Western, Russian and indigenous tactics, but must disseminate lessons across a larger and more diverse fleet.

Readiness is not synonymous with pilot skill. It includes aircraft availability, spare crews, weapons serviceability, fuel, runway condition, data preparation and the ability of headquarters to produce timely orders. A squadron with excellent pilots but insufficient missiles or low aircraft availability may contribute less than a less prestigious unit that can generate repeated sorties. In a short South Asian crisis, the opening alert posture and quality of mission

rehearsal are especially important because political intervention may stop the war before mobilisation reaches full depth.

Command culture can become either a force multiplier or a vulnerability. Central control promotes coherence but may slow local initiative if communications fail. Decentralisation can increase resilience but also raises the risk of misidentification or uncontrolled escalation. The most effective model combines a shared operational picture and clear political intent with delegated tactical authority. Both air forces are moving toward this balance, but the pressure of a real crisis will test whether doctrine survives jamming, deception and incomplete information.

Core functions in the kill chain

The kill chain as an operational process

A modern engagement begins before a fighter sees a target. Sensors detect emissions or radar returns; operators correlate tracks; intelligence and rules of engagement determine identity; a commander assigns a shooter; the shooter receives a target-quality update; the weapon is launched; mid-course guidance keeps the missile inside a useful intercept basket; and post-shot assessment decides whether another weapon is required. Each stage can fail independently.

The PAF's reported May 2025 method reduced the need for the forward fighter to radiate continuously. An AEW&C aircraft or another sensor could provide the initial track, while the fighter used brief radar emissions or remained electronically quiet until required. This makes the shooter harder to detect and forces the target to defend against an attack whose launch point may not be obvious.

Data links: connectivity is not the same as integration

A data link can transmit track coordinates, but an integrated network must also solve time synchronisation, message standards, identity, track quality, access control and electronic protection. Link latency matters because a fast target can move several kilometres while information is being processed. Track confidence matters because a missile cannot be assigned merely to an uncertain symbol. Cyber security matters because corrupted or spoofed data can be worse than no data.

Pakistan's challenge has been connecting U.S., Chinese, Swedish and indigenous systems without exposing sensitive interfaces or creating incompatible pictures. India's challenge is larger because its inventory includes Russian, French, Israeli, indigenous and Western-origin systems across three services. Neither problem is impossible, but Pakistan's smaller, threat-focused architecture can produce local coherence faster, while India's scale can generate broader redundancy once integration is achieved.

Command culture and mission command

Centralised control is valuable for scarce high-end assets, airspace safety and escalation discipline. It can also become a bottleneck if every decision must pass through a vulnerable headquarters. Mission command gives lower formations authority to act within an intent, but it demands trusted training, clear identification and reliable communications. The most resilient structure combines centralised allocation with decentralised execution.

Pakistan's concentrated geography and single principal air threat support rapid central coordination. India must manage Pakistan, China, maritime air defence and a much larger domestic airspace. Its command problem is therefore harder in absolute terms. Indian reforms toward joint theatre structures and integrated air command are strategically important, but organisational change is slower than buying an aircraft.

Degraded-mode operations

A network must continue after its primary AEW&C is pushed back, a satellite link fails or a command node is attacked. Degraded-mode plans include pre-briefed engagement zones, fighter-to-fighter sharing, passive receivers, mobile ground radars, alternate timing sources and delegated weapons control. The force that rehearses failure will be more dangerous than the force that assumes a flawless combat cloud.

The modern kill chain

A kill chain begins with detection but does not end with a radar contact. The track must be classified, associated with a probable identity, evaluated against rules of engagement and passed to a weapon platform in time. Errors at any stage can produce a missed opportunity, fratricide or escalation against the wrong target. Modern air forces therefore invest heavily in track management, data fusion and command procedures. The most effective system is not always the one with the longest-range sensor; it is the one that converts uncertain observations into reliable decisions faster than the opponent.

Pakistan's geographic concentration can simplify this problem in a crisis with India. A comparatively compact battlespace can be covered by overlapping ground radars, airborne warning and fighter patrols. India must manage a much larger national air picture and multiple threat axes. However, India also has greater scope for dispersal, redundancy and deep support orbits. The operational balance depends on whether each side can preserve data quality when communications are jammed, sensors are attacked and false tracks are introduced.

Data links, emissions and the silent fighter

Data links allow a fighter to receive a track without continuously radiating with its own radar. This can reduce warning to the target and separate the sensing platform from the shooter. The concept is frequently described as a hot sensor supporting a cold shooter. In practice, the arrangement requires compatible message formats, precise time synchronisation, track-quality standards and robust identification procedures. A data link does not magically create fire-control quality; it transmits the information produced by sensors and operators.

Emission control is equally important. Fighters, jammers, radars and communication nodes reveal information whenever they transmit. A disciplined force varies power, waveform, timing and location to complicate enemy electronic support. The opponent seeks to build an electronic order of battle, correlate emissions with platform behaviour and target critical nodes. The contest therefore resembles a game of controlled visibility: each side must reveal enough to fight while denying the opponent a stable picture.

Resilience and mission command

Centralised battle management offers efficiency but can create vulnerability if every engagement depends on one airborne or ground node. Resilient networks distribute authority, maintain alternate communications and allow formations to continue under degraded conditions. Mission command is not the absence of control; it is the preparation of subordinate leaders to act within the commander's intent when connectivity fails.

For Pakistan, resilience is essential because the loss of a small number of high-value support assets could reduce the effectiveness of the entire fighter force. For India, resilience is necessary because mixed fleets and commands must share usable information despite different origins and upgrade states. By 2036, the side that rehearses degraded operations - loss of satellite navigation, intermittent data links, damaged runways and partial radar coverage - may possess a more meaningful advantage than the side with the most impressive peacetime network diagram.

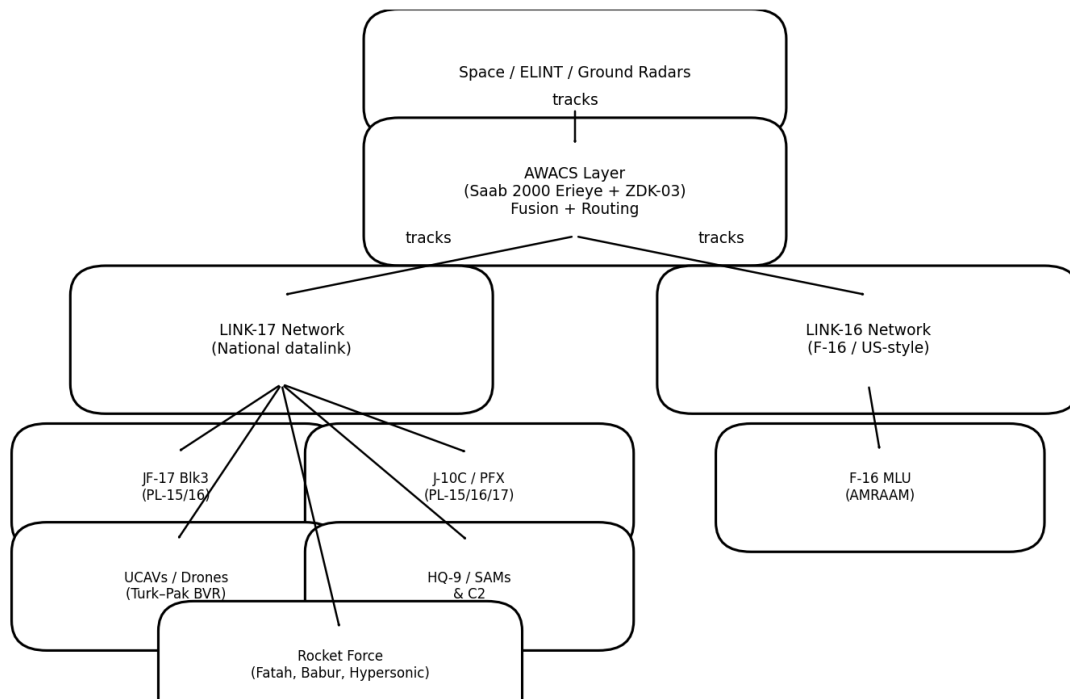


Figure 4.2. Conceptual representation of Pakistani tactical data-link integration. It illustrates network logic and does not verify every connection or platform configuration.

Chapter source notes

[2] Reuters. How Pakistan shot down India's cutting-edge fighter using Chinese gear. 2 August 2025. [Source](#)

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CHAPTER 05

Fighter Forces at the 2026 Baseline

JF-17 Block III, J-10CE, F-16, Rafale, Su-30MKI, Tejas and the roles behind the specifications.

CHAPTER ARGUMENT

The JF-17 Block III is best understood as Pakistan's affordable modern backbone. Its AESA radar, electronic-warfare improvements, glass cockpit and compatibility with contemporary Chinese weapons make it far more relevant than older lightweight fighters, but its smaller airframe limits fuel, payload, radar aperture and growth margin. Its value rises when it receives offboard tracks and performs air defence, escort, precision strike and maritime missions in numbers.

KEY THEMES roles | readiness | stealth

Operational fighter forces: Pakistan and India



JF-17 Block III
TunaFish Spotting / CC BY-SA 4.0



J-10CE
Z3144228 / CC0



PAF F-16D Block 52+
U.S. Air Force / Public domain



IAF Rafale
Dylan Agbagni / CC0

Figure 5.1. Operational fighter forces. Photographs have been normalised into equal frames to preserve alignment and comparability.

Heavy fighters, indigenous production and airborne warning

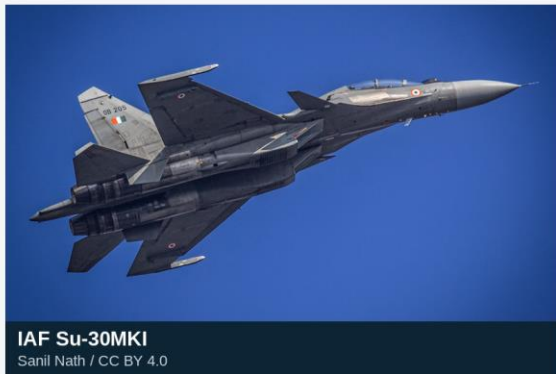


Figure 5.2. Heavy fighters, indigenous production and airborne warning. The images illustrate platform classes rather than relative scale.





Indian Air Force Rafale. Photo: Dylan Agbagni, CC0.



J-35 export-related imagery discussed in Chinese media. Screenshot supplied by the author; final export configuration remains uncertain.

What determines BVR effectiveness

Advertised missile range is not a guaranteed firing distance. Launch altitude and speed, target direction, target manoeuvre, electronic countermeasures and the quality of mid-course updates determine whether a missile reaches the target with enough terminal energy. The more operationally meaningful concept is the no-escape zone: the region in which a target has limited ability to defeat the missile kinematically.

Meteor uses a ramjet sustainer and network-enabled updates to preserve energy deep into the engagement. PL-15 uses a large rocket motor, active radar seeker and data-link support; its exact domestic and export performance remains classified. Astra gives India an indigenous family whose operational value will grow as production, seeker performance and integration mature. None of these weapons is decisive without identification and a reliable track.

Stealth reduces detection and engagement range; it does not create invisibility. Aspect angle, frequency, apertures, external stores, maintenance condition and sensor fusion all matter. Low-observable aircraft gain their greatest advantage when they can sense or receive tracks without revealing themselves and when their weapons remain internal.

The CCTV image reproduced in this chapter labels PL-10, CM-98 and a six-missile PL-15/PL-16 load. It is valuable because it shows the mission set Chinese media wants associated with the aircraft: internal BVR carriage, short-range self-defence and possible suppression-of-air-defence employment.

The image does not prove that every labelled combination is certified, operational or internal. The apparent PL-10 and CM-98 positions are external in the graphic, which would increase radar signature. The central bay label suggests a six-missile objective, but dimensions, ejector arrangement and export configuration cannot be established from a television overlay. It should be treated as programme signalling, not a loadout manual.

CCTV frame labelled CM-98, PL-10 and six PL-15/PL-16: programme messaging rather than proof of a certified combat load.

Fighter roles in 2026

The J-10CE and Rafale are the most politically visible comparison, but they serve within different systems. Rafale offers a mature multirole package, strong electronic warfare, sensor fusion, high-quality weapons and

proven expeditionary support. J-10CE offers a modern AESA radar, long-range Chinese missiles and compatibility with the wider Chinese-Pakistani command ecosystem at a lower acquisition and operating cost. The 2025 battle demonstrated that Rafale is not invulnerable; it did not establish that J-10CE is superior in every mission.

The Su-30MKI remains India's heavy workhorse. Its range, payload and large radar aperture are valuable, and upgrades could preserve its relevance through the 2030s. Its large signature, maintenance burden and dependence on Russian-origin support are disadvantages. Pakistan has no direct numerical equivalent, which is one reason it emphasises long-range missiles, off-board sensing and denial rather than symmetrical heavy-fighter competition.

The F-16 remains important to Pakistan because of its mature avionics, training system and weapons. Its political and sustainment constraints limit future growth. The JF-17 Block III is intended to provide a lower-cost modern fighter with AESA radar and long-range weapons, but it has less range, payload and sensor aperture than medium or heavy fighters. Its strength is that Pakistan can field, maintain and modify it in larger numbers.

Tejas Mk1 and Mk1A represent India's light-fighter pathway. The aircraft offers a modern cockpit, reduced operating burden and increasing indigenous content, but production delays and engine-supply problems have slowed squadron regeneration. Tejas Mk2 is intended to move into a larger medium-weight class. Whether it reaches timely mass production will influence India's dependence on imported Rafales.

The correct comparison therefore asks which aircraft can generate available sorties, receive trustworthy targeting information, carry suitable weapons, survive electronic attack and return to a repaired base. A force of technically superior aircraft with low availability may produce less combat effect than a mixed fleet with reliable support and a coherent mission plan.

A useful 2026 comparison begins with roles. The JF-17 Block III is an affordable multirole platform intended to provide numbers, modern sensors and Chinese weapons. The J-10CE offers a larger radar, greater energy and a higher-end BVR role. The F-16 remains important because of its mature ecosystem, pilot experience and precision capability, even though political restrictions complicate future upgrades. Together these types form a tiered fleet rather than three direct substitutes.

India's Su-30MKI supplies range, payload and the ability to carry large weapons, but its size and maintenance demands require support. Rafale provides a sophisticated electronic-warfare system, Meteor and precision strike in a comparatively small fleet. Mirage 2000 remains valued for precision missions, while Tejas is intended to restore light-fighter numbers. The IAF's challenge is to assign each type according to its strengths while maintaining common situational awareness.

Performance depends on configuration. External fuel tanks and weapons increase radar and infrared signature. High-altitude, high-speed launches increase missile reach, while low-altitude defensive flight reduces it. A fighter with the stronger radar may still receive the first warning from an off-board sensor. For this reason, responsible comparison should avoid fixed declarations such as 'aircraft A always defeats aircraft B'. The more useful question is which force can create favourable geometry, reliable identification and coordinated weapons employment under realistic rules of engagement.

The missile and sensor contest

Beyond-visual-range missile comparisons are frequently reduced to advertised maximum range. This is misleading. A missile launched high and fast against a non-maneuvring target can travel much farther than the same weapon launched low against a defensive fighter. The decisive concept is the no-escape or high-probability engagement zone, which changes with geometry, target energy, electronic countermeasures and mid-course updates.

Pakistan's PL-15 family created strategic surprise in 2025. Reuters reported that the missile which struck a Rafale was fired from roughly 200 kilometres according to Pakistani officials, with Indian officials suggesting an even longer distance. The exact variant and trajectory remain sensitive. The event nevertheless established that Indian estimates of threat range were inadequate and that the PAF could support long-range shots with off-board sensing.

Meteor uses a ramjet sustainer to preserve energy in the terminal phase and remains one of the world's most capable operational air-to-air missiles. Its effectiveness depends on target-quality data, rules of engagement and

the ability of the launching aircraft and network to maintain the engagement. Possessing Meteor did not guarantee that every Indian aircraft was positioned to use it during the opening battle.

India's Astra programme is strategically important because it reduces foreign dependence and can be integrated across multiple Indian aircraft. Later Astra variants aim for longer range. Pakistan similarly benefits from access to evolving Chinese missile families and from the ability to integrate weapons on JF-17. By the 2030s, both sides are likely to field longer-range weapons, dual-pulse or ramjet propulsion, improved seekers and cooperative guidance. This will increase pressure on AEW&C, tankers and jammers rather than only frontline fighters.

Within-visual-range weapons such as PL-10, ASRAAM and R-73 remain relevant, but modern doctrine seeks to avoid a turning fight when long-range shots and distributed sensing can achieve the objective. Close combat will still occur after missiles miss, identification fails or formations penetrate each other's support zones.

Public missile range figures are often marketing numbers measured under favourable conditions. The practical no-escape zone is much smaller and depends on launch speed, altitude, target direction, target energy, guidance quality and electronic countermeasures. PL-15, Meteor and future Astra variants should therefore be compared as parts of engagement systems rather than as simple kilometre claims. Meteor's ramjet is intended to preserve energy late in flight; PL-15 combines long reach with an active seeker and is supported by China's wider sensor ecosystem; Astra gives India increasing control over its own supply and integration.

Missile employment also depends on track quality. A long-range shot against a manoeuvring fighter requires repeated updates until the missile's seeker can acquire the target. These updates may come from the launching fighter or from a networked sensor, depending on architecture. Jamming, false tracks, identification requirements and link interruption can reduce effectiveness. The 2025 battle increased global interest in off-board updates, but open sources do not reveal the complete guidance chain used in every engagement.

The next stage will include missiles designed for internal carriage, shorter control surfaces, multi-mode seekers and greater resistance to deception. Very-long-range weapons may target AWACS and tankers, while compact BVR missiles increase the number carried by stealth fighters. Quantity will matter: a force that owns a small inventory of excellent missiles may be unable to sustain repeated combat. Domestic seeker production, propellant manufacture and test capacity are therefore strategic advantages that cannot be measured by headline range.

Role-based assessment rather than brochure comparison

The JF-17 Block III is best understood as Pakistan's affordable modern backbone. Its AESA radar, electronic-warfare improvements, glass cockpit and compatibility with contemporary Chinese weapons make it far more relevant than older lightweight fighters, but its smaller airframe limits fuel, payload, radar aperture and growth margin. Its value rises when it receives offboard tracks and performs air defence, escort, precision strike and maritime missions in numbers.

The J-10CE is the PAF's higher-end non-stealth air-combat platform. It provides greater energy, payload, sensor capacity and long-range missile employment than JF-17. The reported May 2025 engagement gave it combat credibility, but its success cannot be separated from airborne warning, intelligence and rules of engagement. Pakistan's surviving F-16 fleet remains useful for specialised air defence and strike roles, supported by decades of training and maintenance experience, though U.S. supply and upgrade politics constrain long-term growth.

The Rafale is India's most complete multi-role fighter: mature electronic protection, high-quality sensors, Meteor integration, precision strike and a strong availability concept. The Su-30MKI offers range, payload and fleet mass, but its large signature, mixed-age avionics and maintenance burden make upgrades essential. Tejas Mk1 and Mk1A are important less because they immediately dominate the region than because they create the industrial bridge to Tejas Mk2 and AMCA.

Fighter numbers and usable strength

A nominal squadron is not a fixed number of combat-ready aircraft. Training, deep maintenance, upgrades, accident replacement, engine availability and weapon stocks reduce the number available for an opening package. A smaller fleet with high serviceability and standard weapons can produce more sorties than a larger fleet divided among incompatible subtypes.

Pakistan's force is more vulnerable to the loss of a small number of high-end aircraft, but its JF-17 production line provides a degree of repair and replacement autonomy. India has greater total depth, yet the retirement of MiG-21s and approaching age limits for Jaguars, early MiG-29s and Mirage 2000s create a temporary squadron trough. The 114-Rafale pathway and Tejas production are intended to reverse that decline, but delivery tempo will determine when paper approvals become operational mass.[12][13][14]

Stealth and the limits of platform labels

Low observability reduces detection and tracking range; it does not create invisibility. Radar frequency, aspect, external stores, surface condition, emissions and the quality of the adversary's sensor network all matter. A stealth fighter that broadcasts continuously or carries external weapons gives away some of its advantage. Conversely, a non-stealth fighter can be difficult to target when it operates under emission control and receives offboard information.

This is why J-35 or AMCA should not be judged only by estimated radar cross-section. Mission-data files, sensor fusion, electronic support, weapons-bay capacity, engine reliability, maintenance of coatings and secure links will determine whether either aircraft provides a genuine fifth-generation operational effect.

Pakistan fighter roles and force design

The JF-17 Block III is best understood as the mass of Pakistan's modern fighter force. Its value lies in the combination of an AESA radar, contemporary cockpit, electronic-warfare improvements, modern weapons and a support structure over which Pakistan has substantial control. It cannot match every attribute of a larger fighter, but it can perform air defence, escort, precision strike and maritime missions at a cost that permits meaningful numbers. Its local assembly and upgrade path reduce some of the political and logistical risks that affected earlier fleets.

The J-10CE occupies the higher end of Pakistan's non-stealth fighter force. It offers greater aerodynamic performance, sensor aperture and integration with Chinese long-range weapons. The F-16 fleet remains operationally important because of mature tactics, experienced personnel and multirole flexibility, although age, numbers and external support constraints limit its expansion. Together, these fleets allow Pakistan to allocate specialised missions rather than asking one aircraft type to perform every task.

India fighter roles and the burden of diversity

India's Rafale provides a highly integrated package of sensors, electronic protection, Meteor and stand-off weapons. Its present limitation is scale, not quality. The Su-30MKI supplies range, payload and fleet mass and can serve as a missile carrier, maritime platform and heavy air-superiority fighter. Modernisation could preserve its relevance, but serviceability and upgrade execution are central. Tejas is strategically important as the domestic replacement pathway for ageing light fighters, yet the operational effect depends on production rate, engine availability and timely integration of radar, electronic warfare and weapons.

The IAF's diversity provides flexibility but also creates costs. Different fleets require distinct training systems, spares, test equipment, weapons and software support. Integration across French, Russian, Israeli and Indian systems can be achieved, but it is organisationally demanding. Pakistan's smaller Chinese-centred ecosystem may be easier to connect, while India retains the advantage of a wider industrial and supplier base.

What specifications cannot reveal

Public comparisons often rank aircraft by maximum speed, radar range or missile reach. Such figures conceal the variables that decide combat: serviceability on the day, pilot currency, software configuration, electronic countermeasures, weapon stocks, tanker support and the quality of the common operating picture. A nominally superior aircraft can be placed at a disadvantage by poor geometry or incomplete information. A lighter aircraft can be highly effective when supported by superior situational awareness.

Stealth introduces another complication. Low observability reduces detection and tracking ranges but does not make an aircraft invisible. Its advantage depends on aspect, frequency, external stores, emissions and adversary sensor fusion. The future comparison between a possible Pakistani J-35 and India's non-stealth fleets, or later AMCA, must therefore be made at system level rather than by assigning a single radar-cross-section number.

Role-based fighter comparison

Platform	Primary strength	Principal constraint	Likely role, 2026-30
JF-17 Block III	Affordable AESA-equipped mass; local assembly and integration	Smaller fuel, payload and sensor aperture	Backbone air defence, escort, strike and maritime missions
J-10CE	High-end PAF BVR platform with strong energy and Chinese weapons integration	Small fleet and external dependence	Priority counter-air, long-range interception and selective strike
F-16 A/B MLU	Mature training ecosystem and proven multirole employment	Age, fleet size and U.S. supply politics	Specialised air defence, precision strike and training benchmark
Rafale EH/DH	Integrated sensors, electronic protection, Meteor and stand-off strike	Limited current numbers; expensive expansion	High-end counter-air, deep precision and nuclear/conventional signalling
Su-30MKI	Range, payload, fleet mass and large upgrade potential	Large signature and maintenance burden	Heavy air superiority, maritime strike and missile carrier
Tejas Mk1/Mk1A	Indigenous production path, modern radar/EW potential	Delivery tempo, engine supply and growth margin	Replacement mass, point defence and multirole squadron regeneration

Chapter source notes

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[13] **Reuters**. India backs \$40 billion military upgrade with more Rafale fighters. 12 February 2026. [Source](#)

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CHAPTER 06

AEW&C, Tankers and the Common Operating Picture

Saab 2000 Erieye, ZDK-03, KJ-500, Phalcon, Netra and protection of airborne enablers.

CHAPTER ARGUMENT

An airborne warning aircraft sees farther than a ground radar against low-altitude targets because altitude extends the radar horizon. It can maintain tracks across terrain, direct interceptors, manage tanker and fighter routes and provide missile-support information. Its radar is only one part of the system: operator consoles, communications, electronic support, identification databases and trained controllers are equally important.

KEY THEMES airborne warning | persistence | protection

AEW&C and Support Assets: KJ-500 vs Saab 2000 Erieye

معاون اثاثے: کے جے - 500 بمقابلہ ساب 2000 ایریائے

Aspect / پہلو	KJ-500	Saab 2000 Erieye
Role / کردار	Long-range airborne early warning and command & control	Tactical airborne early warning, surveillance & force multiplier
Airframe type / فریم کی قسم	Larger jet platform	Turboprop platform
Radar concept / ریڈار تصور	Rotodome AESA radar	Side-looking AEW radar
Coverage philosophy / کوریج کا فلسفہ	Broad-area, 360° volumetric surveillance	Focused sector surveillance with agile repositioning
Endurance class / رضوری کلاس	High endurance	Medium endurance
Mission crew space / مشن عملے کی جگہ	Larger mission cabin	More compact mission cabin
Battle management value / جنگی انتظامی قدر	Higher onboard mission volume and C2 bandwidth	Efficient local picture, force multiplier for smaller packages
Datalink ecosystem / ڈیٹالینک نظام	Broad, multi-link architecture for joint & long-range ops	Interoperable links for regional tactical operations
Persistence / تسلسل	Higher persistence over wide areas	Cost-effective persistence in contested or littoral areas
Growth potential / ترقی صلاحیت	High – platform, power & cooling allow future upgrades	Moderate – modular upgrades within compact footprint

Integrated Airborne Support Chain / متحدہ فضائی معاون سلسلہ



Support aircraft can multiply fighter effectiveness by extending awareness, persistence, and coordination.

معاون بیوائی جہاز آگاہی، تسلسل اور باہمی ہم آہنگی کو بڑھا کر لڑکا طیاروں کی کارکردگی کئی گنا بڑھا سکتے ہیں۔

Visual Plate III. KJ-500 and Saab 2000 Erieye support concepts. The plate is illustrative; performance values in the chapter text use cautious open-source wording.



Figure 6.1. Saab 2000 Erieye AEW&C. Pakistan's operational experience with this compact platform is an important part of its network-centric force design. Photo: Dmitry Pichugin, GFDL 1.2 / VRT.

AEW&C Comparison: KJ-500 and Saab 2000 Erieye	
Different classes of airborne warning aircraft serve different operational designs.	
KJ-500	Saab 2000 Erieye
AIRFRAME Larger Y-9 based platform	AIRFRAME Compact high-speed turboprop
RADAR LAYOUT Fixed multi-array AESA Full-circle surveillance concept	RADAR LAYOUT Side-looking Erieye AESA Strong broadside coverage
OPERATIONAL STRENGTHS Greater crew space, power and persistence	OPERATIONAL STRENGTHS Lower footprint and proven Pakistani integration
BEST EMPLOYMENT Theatre battle management and high-volume networking	BEST EMPLOYMENT Efficient tactical control, dispersal and routine persistence
KJ-500 is the stronger strategic battle-management concept; Saab 2000 Erieye remains a highly valuable compact tactical asset.	

Figure 6.2. KJ-500 and Saab 2000 Erieye belong to different platform classes. KJ-500 is a reported offer to Pakistan, not a confirmed operational asset.

KJ-500 and Saab 2000 Erieye: different weight classes

The KJ-500 is based on the larger Y-9 turboprop and uses a fixed dorsal radome with three active-array faces for continuous 360-degree coverage. Its size permits a larger mission crew, electrical capacity and communications suite. Public performance figures are limited and should not be treated as guaranteed combat values.

The Saab 2000 Erieye is a compact, high-speed turboprop AEW&C platform using a side-looking active-array radar. Saab states more than nine hours endurance and a very large surveillance volume. Its principal radar coverage is broadside rather than identical in every direction, so mission planning and aircraft orientation matter.

For Pakistan, the most important distinction is not which aircraft has the longest brochure range. A larger KJ-500-type platform could offer more battle-management capacity and 360-degree persistence, while the Saab 2000 offers a smaller footprint, proven service and easier dispersal. A mixed force could be complementary, but no public evidence establishes Pakistani KJ-500 delivery as of August 2026.

Protecting the enablers

AEW&C and tanker aircraft are force multipliers and high-value targets. Long-range air-to-air missiles, stealth fighters and electronic attack increasingly aim to push them farther from the front. Their survival depends on escort, orbit geometry, passive sensing, threat warning, decoys, fighter barriers and alternative ground or space-based sources.

A resilient force must be able to continue after an AEW&C aircraft is forced off station. Distributed ground radars, fighter-to-fighter sharing, passive receivers and pre-planned degraded-mode procedures are therefore as important as the headline airborne platform.

Airborne early warning and control aircraft are among the most valuable and vulnerable assets in the rivalry. They extend the radar horizon, track formations, coordinate fighters and reduce the need for individual aircraft to radiate continuously. Their value is not simply detection range. Mission-crew training, track quality, identification, link capacity and the ability to operate under jamming determine whether radar detections become usable combat decisions.

Pakistan operates Saab 2000 Erieye and Chinese-origin ZDK-03 systems. The Erieye's side-looking AESA provides strong broadside coverage from a compact and relatively efficient platform. The ZDK-03 adds a Chinese command-and-control pathway. China's offer of the larger KJ-500, if converted into a contract, would potentially add 360-degree coverage, more mission volume and deeper compatibility with J-10 and future Chinese systems. The exact export configuration and delivery status remain unconfirmed publicly.

India operates Israeli-origin Phalcon systems on the Il-76 and indigenous Netra AEW&C on the Embraer platform. The Phalcon provides a large airborne command capability, while Netra reflects India's effort to develop its own mission systems. India has recognised that current numbers are inadequate for continuous coverage across both Pakistan and China fronts and has pursued additional AEW&C capacity.

Tankers determine persistence and geometry. Pakistan's Il-78 fleet can extend fighter endurance, but limited numbers make it a high-value target set. India also faces tanker shortages and has explored leasing and procurement options. In a conflict, both sides would need to protect AEW&C and tankers with fighter screens, emission control, dispersal and multiple orbit locations. Destroying or forcing these aircraft away could reduce the effective range of the entire network.

Airborne early-warning aircraft extend the radar horizon and allow fighters to operate with reduced emissions. Pakistan's Saab 2000 Erieye fleet offers a compact, proven capability, while the ZDK-03 provides a Chinese-origin system that can support different link architectures. A future KJ-500 would add a larger platform, broader 360-degree surveillance and greater mission-system capacity, but the public offer should not be confused with confirmed operational service.

India's Phalcon aircraft provide large-platform endurance and powerful radar coverage, while Netra demonstrates indigenous mission-system development on a smaller airframe. India has recognised the need for more AEW&C assets because a few high-value aircraft cannot cover every axis continuously. Numbers, serviceability and protected orbit geometry are as important as maximum radar range. An AEW&C aircraft forced hundreds of kilometres away by long-range missiles may still contribute, but with reduced low-altitude coverage and greater dependence on other sensors.

Tankers create a different kind of advantage. They increase fighter persistence, allow patrols to be repositioned and support deep strikes, but they are also vulnerable high-value assets. Both sides must protect them through distance, escorts and deception. The future contest may focus less on shooting down frontline fighters and more on threatening the support chain that makes those fighters effective. Stealth aircraft and very-long-range missiles are particularly important because they can impose caution on AWACS and tanker operations without necessarily achieving a kill.

KJ-500 versus Saab 2000 Erieye

AEW&C as the nervous system of the force

An airborne warning aircraft sees farther than a ground radar against low-altitude targets because altitude extends the radar horizon. It can maintain tracks across terrain, direct interceptors, manage tanker and fighter routes and provide missile-support information. Its radar is only one part of the system: operator consoles, communications, electronic support, identification databases and trained controllers are equally important.

Pakistan's Saab 2000 Erieye fleet offers a compact, relatively fast and proven tactical system. Saab publicly advertises more than 9.5 hours endurance and over 2,000 nautical miles range for the Saab 2000 AEW&C platform.[17] The ZDK-03 provides a different radar geometry and Chinese interface path. A reported Chinese offer of KJ-500 aircraft would, if contracted, provide a larger full-circle battle-management platform, but open sources do not confirm Pakistani induction as of August 2026.[10]

KJ-500 versus Saab 2000 Erieye

KJ-500 is based on the larger Y-9 airframe and uses a fixed dorsal radome with multiple phased-array faces. Its probable advantages are mission-crew volume, electrical power, cooling, communications capacity and full-circle coverage. Precise detection and endurance figures published online are mostly unofficial and should not be treated as guaranteed performance.

Saab 2000 Erieye is smaller and uses the characteristic side-looking radar fairing. Its strongest sectors are broadside, while fore and aft coverage is less favourable than a full rotodome concept. Its benefits are a smaller support footprint, high transit speed for a turboprop, mature Pakistani operation and the possibility of dispersal. The two platforms would be complementary: KJ-500 as a theatre-level node, Erieye as a flexible tactical controller.

Protecting the high-value airborne assets

AEW&C and tankers are priority targets for long-range missiles. Protection requires standoff distance, fighter barriers, emission discipline, decoys, alternate orbits, threat warning and the ability to hand control to another node. Very-long-range missiles do not need to destroy an AEW&C to create effect; forcing it hundreds of kilometres farther back can reduce the quality and timeliness of the picture.

Pakistan's smaller geography allows some support aircraft to remain deeper inside national airspace while still contributing. India's larger theatre requires more aircraft and more widely separated orbits, but also provides depth and alternative bases. Both sides need unmanned relays and ground-based backups so that loss or displacement of one aircraft does not collapse the network.

Radar horizon, coverage and orbit geometry

An airborne radar's principal advantage is altitude. By looking over terrain and the curvature limitations that constrain ground radars, AEW&C aircraft can detect low-flying threats earlier and maintain tracks across wider areas. The published instrumented range of a radar is not the same as detection range against every target. Target size, aspect, altitude, jamming, clutter and waveform management all matter. Orbit placement is therefore a tactical calculation: the aircraft must be close enough to provide useful coverage but far enough from enemy fighters and long-range missiles to survive.

The Saab 2000 Erieye's side-looking array provides strong broadside surveillance and a compact operational footprint. Its crew and operators learn to orient the aircraft and manage sectors to compensate for weaker nose and tail geometry. A KJ-500-class platform offers a larger airframe, more onboard volume and a full-circle radar concept. If Pakistan eventually receives it, the benefit would not simply be longer range; it would be greater mission capacity, communications and persistence.

Battle management rather than flying radar

AEW&C crews do more than report contacts. They allocate fighters, maintain identification, deconflict friendly aircraft, relay threat warnings and help manage weapons. Their value grows with operator experience and

standardised procedures. Pakistan's long experience with Erieye and ZDK-03 platforms has created institutional expertise that cannot be purchased with a new airframe. A future KJ-500 would need to be integrated into this human system.

India's Phalcon and Netra fleets provide complementary capabilities, but fleet size and availability determine whether continuous coverage can be maintained on more than one front. Planned expansion is strategically important because India cannot exploit its larger fighter inventory fully without sufficient airborne battle management. Both sides must also protect AEW&C aircraft from long-range air-to-air missiles, electronic attack and attempts to disrupt their communications.

Tankers and the endurance equation

Air-to-air refuelling changes the geometry of a campaign. It permits fighters to remain on station, approach from less predictable directions, carry heavier weapon loads and recover when bases are distant or damaged. Tankers also create vulnerabilities: their predictable orbits and large signatures make them attractive targets. Effective tanker operations require fighter protection, dispersed basing and disciplined emission control.

Pakistan's tanker capacity is limited and must be allocated carefully. India's larger geography and maritime requirements make tankers even more important, but also increase demand. By 2036, unmanned refuelling concepts may appear, yet the immediate issue remains conventional: aircraft availability, boom or probe compatibility, trained crews and the ability to sustain protected tracks during a high-tempo crisis.

Feature	KJ-500 concept	Saab 2000 Erieye
Airframe class	Larger Y-9 transport-derived platform	Compact high-speed turboprop
Radar geometry	Fixed dorsal radome with multiple phased-array faces; full-circle concept	Side-looking Erieye AESA with strongest broadside sectors
Mission volume	Greater potential crew, power, cooling and communications capacity	Smaller crew footprint and mature tactical workflow
Best use	Theatre-level battle management and high-volume networking	Dispersed tactical control, routine surveillance and efficient persistence
Pakistan status	Reported Chinese offer; induction not publicly confirmed as of August 2026	Operational and well integrated in PAF service

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CHAPTER 07

The BVR Missile and Sensor Contest

PL-15, Meteor, Astra, AMRAAM, seekers, mid-course updates and realistic engagement geometry.

CHAPTER ARGUMENT

The most important public lesson from May 2025 is not an exact advertised range. Indian officials told Reuters that the engagement exposed a faulty assumption about the PL-15's reach, while Pakistani officials described a launch at roughly 200 kilometres.[2] Such accounts remain sensitive and geometry-dependent, but they show that planning against a brochure figure can be dangerous. High launch altitude, speed, an approaching target and continuous mid-course updates can extend useful reach; a low, receding, manoeuvring target can reduce it dramatically.

KEY THEMES geometry | seekers | updates

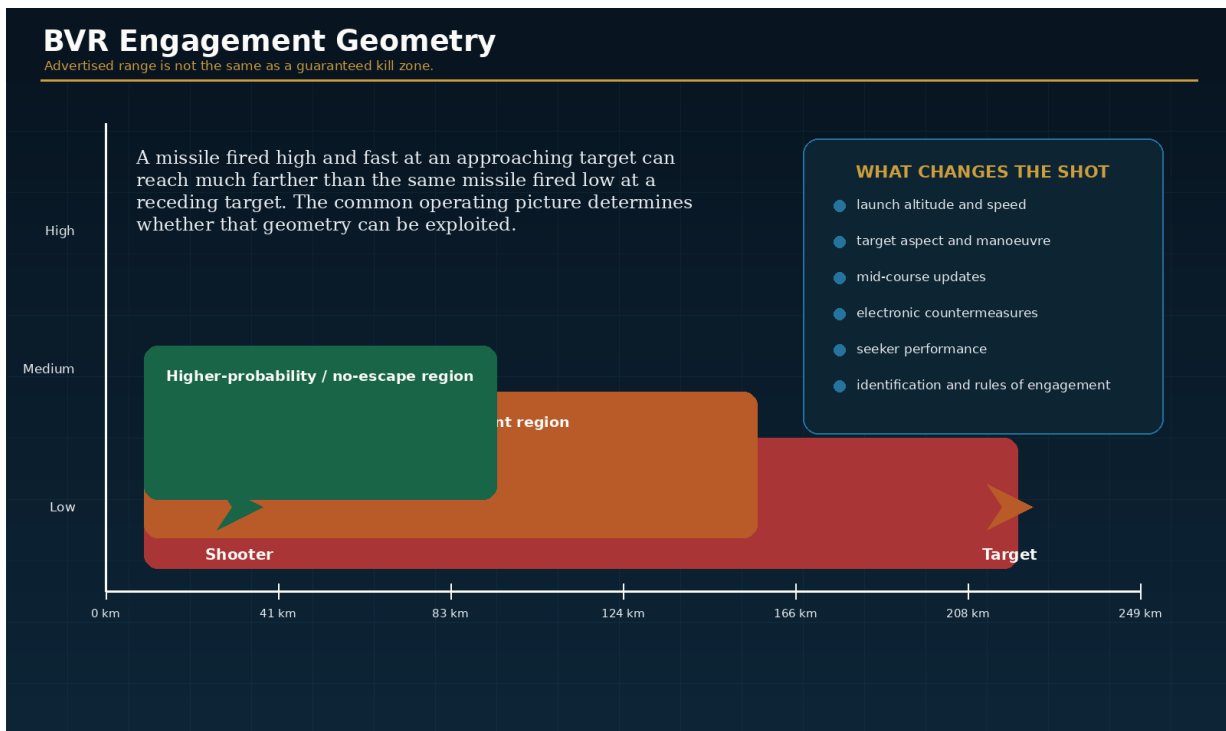


Figure 7.1. BVR range is conditional. The useful engagement zone depends on energy, aspect, updates, countermeasures and identification.

What determines BVR effectiveness

Advertised missile range is not a guaranteed firing distance. Launch altitude and speed, target direction, target manoeuvre, electronic countermeasures and the quality of mid-course updates determine whether a missile reaches the target with enough terminal energy. The more operationally meaningful concept is the no-escape zone: the region in which a target has limited ability to defeat the missile kinematically.

Meteor uses a ramjet sustainer and network-enabled updates to preserve energy deep into the engagement. PL-15 uses a large rocket motor, active radar seeker and data-link support; its exact domestic and export performance remains classified. Astra gives India an indigenous family whose operational value will grow as production, seeker performance and integration mature. None of these weapons is decisive without identification and a reliable track.

Stealth reduces detection and engagement range; it does not create invisibility. Aspect angle, frequency, apertures, external stores, maintenance condition and sensor fusion all matter. Low-observable aircraft gain their greatest advantage when they can sense or receive tracks without revealing themselves and when their weapons remain internal.

The CCTV image reproduced in this chapter labels PL-10, CM-98 and a six-missile PL-15/PL-16 load. It is valuable because it shows the mission set Chinese media wants associated with the aircraft: internal BVR carriage, short-range self-defence and possible suppression-of-air-defence employment.

The image does not prove that every labelled combination is certified, operational or internal. The apparent PL-10 and CM-98 positions are external in the graphic, which would increase radar signature. The central bay label suggests a six-missile objective, but dimensions, ejector arrangement and export configuration cannot be established from a television overlay. It should be treated as programme signalling, not a loadout manual.

CCTV frame labelled CM-98, PL-10 and six PL-15/PL-16: programme messaging rather than proof of a certified combat load.

The J-10CE and Rafale are the most politically visible comparison, but they serve within different systems. Rafale offers a mature multirole package, strong electronic warfare, sensor fusion, high-quality weapons and proven expeditionary support. J-10CE offers a modern AESA radar, long-range Chinese missiles and compatibility with the wider Chinese-Pakistani command ecosystem at a lower acquisition and operating cost. The 2025 battle demonstrated that Rafale is not invulnerable; it did not establish that J-10CE is superior in every mission.

The Su-30MKI remains India's heavy workhorse. Its range, payload and large radar aperture are valuable, and upgrades could preserve its relevance through the 2030s. Its large signature, maintenance burden and dependence on Russian-origin support are disadvantages. Pakistan has no direct numerical equivalent, which is one reason it emphasises long-range missiles, off-board sensing and denial rather than symmetrical heavy-fighter competition.

The F-16 remains important to Pakistan because of its mature avionics, training system and weapons. Its political and sustainment constraints limit future growth. The JF-17 Block III is intended to provide a lower-cost modern fighter with AESA radar and long-range weapons, but it has less range, payload and sensor aperture than medium or heavy fighters. Its strength is that Pakistan can field, maintain and modify it in larger numbers.

A useful 2026 comparison begins with roles. The JF-17 Block III is an affordable multirole platform intended to provide numbers, modern sensors and Chinese weapons. The J-10CE offers a larger radar, greater energy and a higher-end BVR role. The F-16 remains important because of its mature ecosystem, pilot experience and precision capability, even though political restrictions complicate future upgrades. Together these types form a tiered fleet rather than three direct substitutes.

India's Su-30MKI supplies range, payload and the ability to carry large weapons, but its size and maintenance demands require support. Rafale provides a sophisticated electronic-warfare system, Meteor and precision strike in a comparatively small fleet. Mirage 2000 remains valued for precision missions, while Tejas is intended to restore light-fighter numbers. The IAF's challenge is to assign each type according to its strengths while maintaining common situational awareness.

Performance depends on configuration. External fuel tanks and weapons increase radar and infrared signature. High-altitude, high-speed launches increase missile reach, while low-altitude defensive flight reduces it. A fighter with the stronger radar may still receive the first warning from an off-board sensor. For this reason, responsible comparison should avoid fixed declarations such as 'aircraft A always defeats aircraft B'. The more useful question is which force can create favourable geometry, reliable identification and coordinated weapons employment under realistic rules of engagement.

The missile and sensor contest

Beyond-visual-range missile comparisons are frequently reduced to advertised maximum range. This is misleading. A missile launched high and fast against a non-maneuvring target can travel much farther than the same weapon launched low against a defensive fighter. The decisive concept is the no-escape or high-probability engagement zone, which changes with geometry, target energy, electronic countermeasures and mid-course updates.

Pakistan's PL-15 family created strategic surprise in 2025. Reuters reported that the missile which struck a Rafale was fired from roughly 200 kilometres according to Pakistani officials, with Indian officials suggesting an even longer distance. The exact variant and trajectory remain sensitive. The event nevertheless established that Indian estimates of threat range were inadequate and that the PAF could support long-range shots with off-board sensing.

Meteor uses a ramjet sustainer to preserve energy in the terminal phase and remains one of the world's most capable operational air-to-air missiles. Its effectiveness depends on target-quality data, rules of engagement and the ability of the launching aircraft and network to maintain the engagement. Possessing Meteor did not guarantee that every Indian aircraft was positioned to use it during the opening battle.

India's Astra programme is strategically important because it reduces foreign dependence and can be integrated across multiple Indian aircraft. Later Astra variants aim for longer range. Pakistan similarly benefits from access to evolving Chinese missile families and from the ability to integrate weapons on JF-17. By the 2030s, both sides are likely to field longer-range weapons, dual-pulse or ramjet propulsion, improved seekers and cooperative guidance. This will increase pressure on AEW&C, tankers and jammers rather than only frontline fighters.

Within-visual-range weapons such as PL-10, ASRAAM and R-73 remain relevant, but modern doctrine seeks to avoid a turning fight when long-range shots and distributed sensing can achieve the objective. Close combat will still occur after missiles miss, identification fails or formations penetrate each other's support zones.

Public missile range figures are often marketing numbers measured under favourable conditions. The practical no-escape zone is much smaller and depends on launch speed, altitude, target direction, target energy, guidance quality and electronic countermeasures. PL-15, Meteor and future Astra variants should therefore be compared as parts of engagement systems rather than as simple kilometre claims. Meteor's ramjet is intended to preserve energy late in flight; PL-15 combines long reach with an active seeker and is supported by China's wider sensor ecosystem; Astra gives India increasing control over its own supply and integration.

Missile employment also depends on track quality. A long-range shot against a manoeuvring fighter requires repeated updates until the missile's seeker can acquire the target. These updates may come from the launching fighter or from a networked sensor, depending on architecture. Jamming, false tracks, identification requirements and link interruption can reduce effectiveness. The 2025 battle increased global interest in off-board updates, but open sources do not reveal the complete guidance chain used in every engagement.

The next stage will include missiles designed for internal carriage, shorter control surfaces, multi-mode seekers and greater resistance to deception. Very-long-range weapons may target AWACS and tankers, while compact BVR missiles increase the number carried by stealth fighters. Quantity will matter: a force that owns a small inventory of excellent missiles may be unable to sustain repeated combat. Domestic seeker production, propellant manufacture and test capacity are therefore strategic advantages that cannot be measured by headline range.

PL-15 and the 2025 range surprise

The most important public lesson from May 2025 is not an exact advertised range. Indian officials told Reuters that the engagement exposed a faulty assumption about the PL-15's reach, while Pakistani officials described a launch at roughly 200 kilometres.[2] Such accounts remain sensitive and geometry-dependent, but they show that planning against a brochure figure can be dangerous. High launch altitude, speed, an approaching target and continuous mid-course updates can extend useful reach; a low, receding, manoeuvring target can reduce it dramatically.

The distinction between the domestic Chinese PL-15 and the PL-15E export version remains unresolved in public evidence. It is therefore more responsible to say that Pakistan demonstrated a long-range active-radar engagement capability greater than Indian planners expected than to state a definitive missile model and maximum range.

Meteor, Astra and AMRAAM

Meteor uses a throttleable air-breathing propulsion concept intended to retain energy late in flight. MBDA emphasises a large no-escape zone, network-enabled targeting and resistance to countermeasures but does not publish a simple official maximum range.[18] Its advantage is greatest when the launch aircraft or a supporting sensor maintains a high-quality track and when the target is forced to defend before it can launch effectively.

Astra gives India an indigenous missile family and reduces dependence on foreign suppliers. Astra Mk1 is entering wider use, while Mk2 is intended to extend reach. The exact fielding status and performance of later variants should be treated carefully until operational integration is publicly demonstrated. AIM-120 remains a mature weapon in Pakistani F-16 service, but stock age, variant and resupply politics affect its future relevance.

Seekers, updates and countermeasures

A long-range missile normally begins with inertial guidance, receives mid-course corrections and activates its own seeker later. The quality of the updates determines how large an area the seeker must search. A target can use jamming, towed decoys, chaff, manoeuvre, terrain and formation tactics to break the track or drain missile energy. The launch platform may also fire more than one missile to complicate defence.

This makes electronic support and passive detection important. A fighter that recognises hostile radar modes or missile-support emissions gains warning before its radar warning receiver identifies a terminal seeker. By 2036, multi-mode seekers combining active radar, passive RF and perhaps infrared cues are likely to make simple jamming less reliable.

The no-escape-zone concept

The no-escape zone is not a fixed circle. It is the region in which a target is unlikely to defeat the missile through kinematics alone. It changes with altitude, speed, aspect, target type and missile energy management. Training therefore focuses on launch acceptability regions, timelines and cooperative tactics rather than memorising one range number. The side with better offboard tracks can launch earlier while keeping its own fighter less exposed.

Missile kinematics and the no-escape zone

A missile's advertised maximum range normally describes a favourable test geometry, not a guaranteed combat result. Launch altitude, speed, target aspect and manoeuvre determine how much energy remains at intercept. A high and fast fighter launching against a target that continues to approach can achieve much greater effective reach than a low, slow fighter firing at a target that immediately turns away. The no-escape zone is therefore more useful than headline range, but it too varies with assumptions.

The 2025 conflict showed the operational value of extending the threat envelope. Indian formations had to respect a missile family whose practical employment they appear to have underestimated. This does not mean that every PL-15 shot was lethal or that the missile is unbeatable. It means that its combination with offboard tracking and favourable launch geometry altered the decisions available to Indian pilots.

Guidance, mid-course updates and terminal seekers

Most modern BVR missiles use inertial navigation during the initial phase, receive updates from the launching aircraft or another network node and activate an onboard seeker near the predicted intercept. The quality and continuity of updates matter because the target may change speed, altitude or direction after launch. If the missile receives no correction, its terminal seeker must search a larger volume and may have less energy to manoeuvre.

Electronic warfare attacks this process. The defender can jam the fighter radar, interfere with data links, deploy decoys and use manoeuvre to force the missile to expend energy. The attacker can vary waveforms, use passive sensors and launch multiple weapons from separated positions. The resulting contest cannot be reduced to seeker type alone. It is a chain involving detection, track precision, launch authority, updates, terminal discrimination and post-launch tactics.

PL-15, Meteor, Astra and magazine depth

PL-15 and Meteor represent different engineering approaches to long-range air combat. Meteor's ramjet sustainer is designed to preserve energy and enlarge the no-escape zone. PL-15 uses a powerful conventional motor and is integrated into a Chinese sensor and data-link ecosystem. Public information does not support precise comparison under all conditions. Astra gives India an increasingly important indigenous path, reducing dependence on imported missile stocks as integration expands.

Magazine depth may become more decisive than small differences in individual performance. High-end missiles are expensive, require storage and maintenance, and can be expended rapidly during repeated alerts or saturation attacks. Pakistan must balance quality with affordable inventory; India must produce and integrate sufficient indigenous weapons across diverse fleets. A force unable to replenish missiles will lose its theoretical range advantage long before it loses all of its aircraft.

Missile families in operational context

Weapon family	Publicly supportable description	Key operational issue
PL-15 / PL-15E	Long-range active-radar BVR family; exact Pakistani variant and maximum range remain unconfirmed	2025 engagement showed Indian range assumptions were inadequate; geometry and offboard updates mattered
Meteor	Network-enabled ramjet-powered BVR missile; manufacturer emphasises a large no-escape zone	Requires high-quality tracks and effective launch geometry; official maximum range not published
Astra Mk1 / Mk2	Indian indigenous BVR family, with Mk2 intended to extend reach	Production scale and full integration across IAF fleets determine effect
AIM-120 family	Mature active-radar missile used by Pakistani F-16s	Variant, inventory age and resupply constraints affect future weight
PL-10 / ASRAAM / R-73 class	High-agility short-range weapons paired with helmet-mounted sights	Merge awareness, off-boresight cueing and countermeasures matter more than nominal range

Chapter source notes

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CHAPTER 08

Integrated Air Defence and the SEAD/DEAD Contest

S-400, HQ-9B, Akash, MRSAM, mobility, decoys and the problem of surviving a first strike.

CHAPTER ARGUMENT

Long-range surface-to-air systems shape enemy planning even when they do not fire. They can push support aircraft back, force low-level routing, require electronic-attack support and increase the number of weapons needed for a strike. Their advertised maximum ranges usually apply to favourable high-altitude targets. Radar horizon and terrain can reduce warning against low-flying cruise missiles to a fraction of the headline distance.

KEY THEMES layering | mobility | SEAD

Integrated Air Defence and SEAD

فضائی دفاع اور سیڈ

An S-400-style long-range surface-to-air system is the backbone of a modern Integrated Air Defence System (IADS). Its effectiveness depends on sensors, shooters, networking and the ability to survive and operate in a contested environment.

ایس-400 طرز کا طویل فاصلے تک مار کرنے والا فضائی دفاعی نظام جدید ایک مربوط فضائی دفاعی نظام (IADS) کی ریزہ کی ہڈی ہے۔ اس کی کارکردگی سینسز، لانچر، نیٹ ورکنگ اور ممتاز ماحول میں زندہ رہنے اور کام جاری رکھنے کی صلاحیت پر منحصر ہے۔

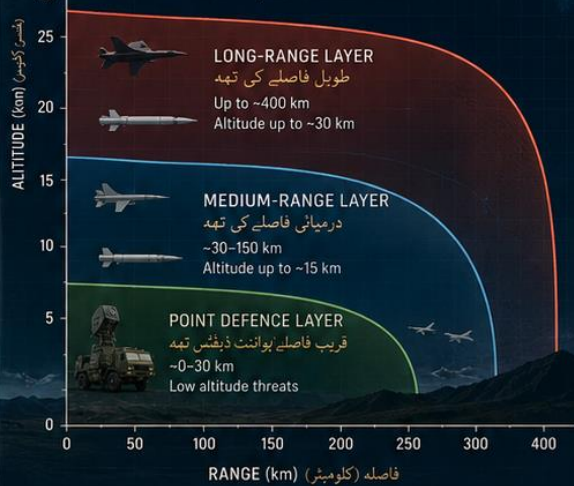
S-400 STYLE IADS – LAYERED ARCHITECTURE

ایس-400 طرز کا مربوط فضائی دفاعی نظام – تہہ دار ساخت



ENGAGEMENT ENVELOPE (NOTIONAL)

انگیجمنٹ انویلپ (تصوراتی)



KEY FACTORS AFFECTING ENGAGEMENT OUTCOME

انگیجمنٹ کے نتائج پر اثر انداز ہونے والے اہم عوامل

TARGET ALTITUDE ہدف کی بلندی	Higher altitude targets are easier to detect and engage. بلند پرواز اہداف کی کھوج اور انہیں نشانہ بنانا آسان ہوتا ہے۔
SPEED رفتار	Higher speed shortens reaction and engagement time. زیادہ رفتار سے رد عمل اور نشانہ بنانے کا وقت کم ہو جاتا ہے۔
RCS (RADAR CROSS SECTION) آر سی ایس	Lower RCS reduces detection range and track quality. کم آر سی ایس سے کھوج کا فاصلہ اور ٹریکنگ معیار کم ہوتا ہے۔
TERRAIN MASKING زمینی پناہ	Mountains and features can hide low-level targets. پہاڑ اور زمین کی خصوصیات کم بلندی پر اہداف کو چھپا سکتی ہیں۔
ECM ENVIRONMENT ای سی ایم ماحول	Jamming and deception degrade detection and guidance. جھینک اور دھوکہ دہی کھوج اور رہنمائی کو متاثر کرتے ہیں۔
NETWORKING QUALITY نیٹ ورکنگ کا معیار	Stronger networks improve situational awareness and weapon coordination. مضبوط نیٹ ورک سچھتی آگاہی اور ہتھیاروں کی ہم آہنگی بہتر بناتا ہے۔

WHY PERFORMANCE VARIES

کارکردگی کیوں بدلتی ہے

Real-world effectiveness is not only about missile range. اصل دنیا میں کارکردگی صرف میزائل کے فاصلے سے مشروط نہیں ہوتی۔	It depends on target profile (altitude, speed, RCS), approach path and tactical timing. یہ ہدف کے پروفائل (بلندی، رفتار، آر سی ایس)، آپریشن کے راستے اور تaktیکی وقت پر منحصر ہے۔
Terrain, clutter and ECM can degrade sensors and links. زمین، شور اور ای سی ایم سینسز اور لنکس کو کمزور کر سکتے ہیں۔	Network quality and operator proficiency strongly influence outcomes. نیٹ ورک کے معیار اور عملہ کی مہارت نتائج پر گہرا اثر ڈالتی ہے۔
Every engagement is a probability problem, not a guarantee. ہر انگیجمنٹ ایک امکانات کا مسئلہ ہے، ضمانت نہیں۔	

PAKISTANI LAYERED DEFENCES (CONCEPTUAL)

پاکستانی تہہ دار دفاعات (تصوراتی)



COUNTER-SEAD PRESSURES / انسدادی دباؤ

DECOYS ڈیکوئز Bait radars and missiles ریڈار اور میزائل کو دھوکہ دینا	DRONES ڈرونز Reconnaissance, targeting and attrition جاموسی، نشانہ بنانا اور کھسکاؤ	LOW-LEVEL INGRESS کم بلندی پر داخلہ Use terrain to avoid detection زمین کا فائدہ اٹھا کر کھوج سے بچنا	SATURATION زیادہ تعداد Overwhelm sensors and weapons سینسز اور ہتھیاروں کو بوجھل کرنا	STAND-OFF WEAPONS دور سے مار کرنے والے ہتھیار Attack from outside engagement envelope انگیجمنٹ انویلپ کے باہر سے حملہ	ELECTRONIC WARFARE الیکٹرانک وار فیئر Jamming, deception and disruption جھینک، دھوکہ دہی اور خلل ڈالنا
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★ Integrated sensors, layered weapons and resilient networks — together with smart tactics — are the key to survival and control.

مربوط سینسز، تہہ دار ہتھیار اور مضبوط نیٹ ورک — ساتھ ساتھ ہوشمند تاکتیکیں — زندہ رہنے اور کنٹرول کی کلید ہیں۔

07

Visual Plate IV. Integrated air defence and the SEAD contest. Engagement envelopes are conceptual and should not be read as guaranteed combat ranges.



Figure 8.1. Airborne warning, air defence and the emerging stealth factor. Images are presented at standardised size for visual comparison.

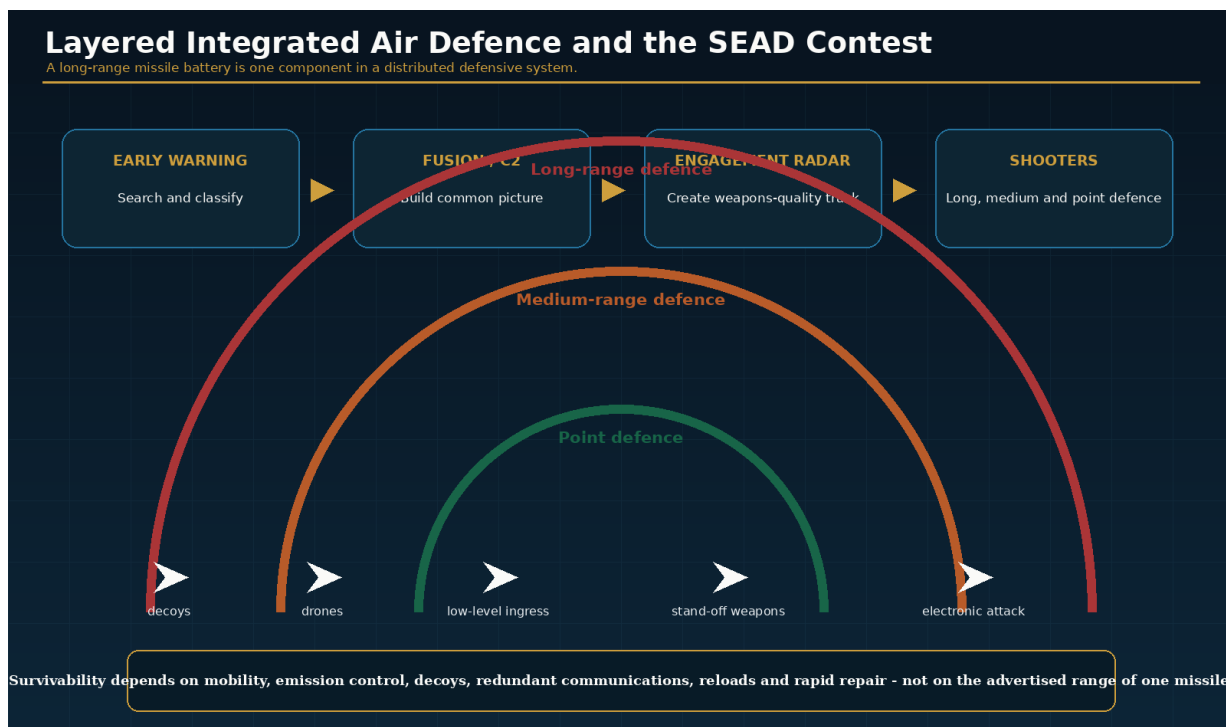


Figure 8.1. Air defence is a layered, mobile network. Stand-off weapons, drones, decoys and electronic attack seek to break the chain rather than defeat one missile in isolation.

An air-defence system is a chain, not a circle

S-400, HQ-9 and other long-range systems are often drawn as perfect circles. Real coverage is broken by terrain, radar horizon, emissions policy, target radar cross-section, jamming and the need to distinguish hostile tracks. A low-flying cruise missile may remain hidden until much closer than a high-altitude aircraft.

A layered IADS combines early-warning radars, engagement radars, passive sensors, command nodes, long-range missiles, medium-range systems and point defence. The network must survive anti-radiation missiles, drones, decoys, cyber attack and strikes on power, communications and reload vehicles.

SEAD suppresses the defence long enough to create access; DEAD aims to destroy it. The attacker may use stand-off weapons, electronic attack, false targets, loitering munitions, terrain masking and saturation. The defender responds through mobility, emission control, decoys, distributed launchers and rapid reconstitution.

A long-range surface-to-air missile system is not a circular wall with a fixed radius. Detection and engagement are shaped by radar horizon, target altitude, radar cross-section, speed, terrain, jamming and the availability of identification and firing authority. Low-flying cruise missiles may remain hidden behind terrain until late, while high-altitude aircraft can be detected at long distance but may still operate outside the missile's effective no-escape zone.

India's S-400 systems provide long-range surveillance and engagement options and complicate Pakistani operations. Their effectiveness depends on dispersal, radar discipline, layered point defence and integration with IACCS and other sensors. Pakistan's HQ-9B and HQ-16 layers serve a similar denial function at different ranges. Public reports of HQ-19 as part of a Chinese offer suggest interest in higher-tier missile defence, but an offer is not the same as an operational battery.

The attacker will attempt suppression or destruction of enemy air defences through electronic attack, anti-radiation missiles, decoys, drones, low-level routes and standoff weapons. The defender will use mobility, false emitters, emission control, passive sensors and layered short-range systems. The contest is dynamic: a radar that remains silent survives but contributes less to the picture; a radar that radiates provides information but becomes targetable.

Claims about destroyed S-400 or HQ-9 components in 2025 remain contested. Open evidence supports impacts at military facilities and a major effort by both sides to attack and protect radar networks, but it does not justify treating every declared kill as confirmed. The more important lesson is that expensive long-range systems require many cheaper supporting nodes. A battery without decoys, point defence, repair teams and redundant sensors can become a high-value liability.

Long-range air defence is a system of systems. The S-400, HQ-9 family and indigenous Indian and Pakistani layers depend on surveillance radars, engagement radars, communications, decoys, mobility, trained crews and shorter-range protection. A quoted 400-kilometre missile range does not create a 400-kilometre impenetrable circle. Radar horizon, target altitude, terrain, electronic warfare and the need to identify targets safely shape the real engagement envelope.

India's S-400 provides an important capacity to threaten high-altitude aircraft and complicate Pakistani planning. Pakistan's HQ-9B and HQ-16 layers provide similar denial functions at different ranges. Both networks face suppression tactics: drones can provoke emissions, decoys can saturate tracking, anti-radiation weapons can attack radars, and stand-off missiles can target command or logistics. Mobile systems improve survival, but movement reduces continuous coverage and requires disciplined emission control.

SEAD is therefore an intelligence contest before it is a missile contest. Attackers must locate emitters, distinguish real systems from decoys and coordinate electronic, kinetic and cyber effects. Defenders must manage emissions, move batteries, use passive sensors and avoid revealing the entire network against cheap targets. No modern air defence is invulnerable, but destroying or suppressing it is costly and uncertain. The strategic question is whether the system can preserve enough coverage to protect key assets and impose unacceptable risk on the attacker.

S-400 and HQ-9B in realistic context

Long-range surface-to-air systems shape enemy planning even when they do not fire. They can push support aircraft back, force low-level routing, require electronic-attack support and increase the number of weapons

needed for a strike. Their advertised maximum ranges usually apply to favourable high-altitude targets. Radar horizon and terrain can reduce warning against low-flying cruise missiles to a fraction of the headline distance.

India's S-400 provides long-range surveillance and multiple missile classes, while Pakistan's HQ-9B provides a Chinese-origin long-range layer. Neither system forms an impenetrable dome. Both depend on search radars, engagement radars, command links, communications, power, reload vehicles and protection from drones and stand-off weapons. A battery that survives but cannot communicate or receive a reliable track has lost much of its value.

Layering and point defence

Medium-range systems such as MRSAM/Barak-8, Akash variants and HQ-16-type systems protect areas and fill gaps. Short-range gun and missile systems defend radar and launcher sites against low-altitude threats. Man-portable systems, dispersed anti-aircraft guns and electronic counter-drone equipment add local friction. The layers should force an attacker to spend several different kinds of weapons rather than rely on one solution.

Base defence also includes hardened shelters, runway repair, camouflage, decoys, fuel dispersal and alternate command posts. An air force that protects aircraft but loses fuel, weapons handling or communications may still be unable to generate sorties.

How SEAD and DEAD work

Suppression of enemy air defences aims to create temporary access. Destruction of enemy air defences aims to remove the system. Attackers combine anti-radiation missiles, stand-off glide weapons, cruise missiles, drones, decoys, cyber effects and electronic attack. The defender responds with mobility, brief emissions, passive sensors, false emitters and rapid relocation.

The May 2025 exchange suggested that both sides could penetrate parts of the other's defence using stand-off weapons and saturation. It did not prove that either IADS had failed as a whole. A radar may switch off deliberately, a missile may be conserved for a higher-value target, and a strike can cause local damage without creating lasting air superiority.

Counter-stealth air defence

Low-frequency radar may provide early warning of a stealth aircraft, but its track may lack the precision needed for a missile shot. A layered counter-stealth system combines low-frequency search, passive electronic support, multistatic geometry, infrared sensors and a higher-frequency engagement radar activated only when uncertainty has narrowed. The network, not a single anti-stealth radar, creates the opportunity.

IADS as a distributed combat system

An integrated air-defence system connects early-warning radars, engagement radars, command posts, surface-to-air missiles, point defences, passive sensors and fighters. Its strength lies in overlap and mutual support. A long-range system can force enemy aircraft to fly lower or farther away, while medium- and short-range systems protect the radars and launchers that sustain the network. Fighters exploit the same tracks to intercept aircraft attempting to avoid surface threats.

The S-400 and HQ-9 families are often discussed as isolated super-weapons. Their real effectiveness depends on deployment, radar coverage, training, mobility and integration with other layers. Terrain can create gaps; electronic attack can degrade tracks; static emitters can be located. Conversely, a mobile and disciplined battery can complicate enemy planning even when it never launches, because the attacker must allocate jammers, decoys and stand-off weapons against a threat whose exact location is uncertain.

SEAD, DEAD and the attacker's problem

Suppression of enemy air defences seeks to reduce the defender's ability to engage for a period; destruction seeks to remove critical nodes more permanently. The attacker may use anti-radiation weapons, cruise missiles, glide weapons, drones, decoys and cyber or electronic attack. The defender responds by relocating, turning radars on only briefly, using remote sensors, deploying false emitters and protecting key elements with point defence.

This contest is iterative. A radar that remains silent survives but contributes less to the picture. A jammer that radiates protects the strike package but becomes detectable. A decoy may draw a missile, but repeated patterns can reveal deception. The side with better intelligence preparation and faster battle-damage assessment can adapt the next wave more effectively.

Regional systems and realistic limitations

India's S-400 batteries extend the threat to high-value aircraft and shape Pakistani route planning. Akash, MRSAM and other systems add layers around bases and strategic sites. Pakistan's HQ-9/P, HQ-16/LY-80 family and shorter-range systems serve a comparable architecture on a smaller geographic scale. Public maximum ranges should not be drawn as guaranteed circles on a map. Low-altitude radar horizon, mountains, clutter, target signature and electronic warfare can shrink the useful engagement zone.

The survival of air bases is equally important. Hardened shelters, runway repair, dispersal, camouflage and redundant command links determine whether aircraft can continue operating after missile and drone attacks. A modern IADS must defend not only airspace but also the logistics that generate sorties.

Layer	Pakistan examples	India examples	Operational purpose
Long range	HQ-9/P family	S-400	Shape airspace, threaten high-value aircraft and defend strategic areas
Medium range	HQ-16/LY-80 family and other systems	MRSAM/Barak-8, Akash variants, SPYDER elements	Area and base defence; fill gaps below the long-range layer
Point defence	Short-range SAMs, guns and counter-drone systems	Short-range SAMs, guns, SPYDER and counter-drone systems	Protect radars, launchers, bases and command nodes
Passive / supporting	Mobile radars, passive receivers, decoys and EW	Mountain radars, passive sensors, decoys and EW	Preserve the network, classify raids and complicate SEAD

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CHAPTER 09

Electronic Warfare, Cyber, Space and Information Operations

The invisible contest over emissions, navigation, mission data, communications and public narratives.

CHAPTER ARGUMENT

Electronic warfare is often described as simply jamming a radar. The more sophisticated objective is to influence the opponent's confidence: make a real track appear uncertain, create false targets, delay a message, force an emitter to change mode or reveal a hidden sensor. Noise jamming can deny information but also announces the jammer's presence. Deception may be more valuable because the victim continues to operate while making the wrong decision.

KEY THEMES spectrum | cyber | space



Figure 9.1. Modern air war expands beyond the fighter cockpit into spectrum operations, space support, cyber resilience and industrial sustainment.

The new technology stack

Electronic warfare includes passive support measures, communications intelligence, noise jamming, deception, self-protection and offensive cyber-electromagnetic activity. The most sophisticated effect may be invisible: a track delayed, a link mistrusted, a seeker seduced or an operator forced to switch to a less efficient procedure.

Space systems provide imagery, communications, navigation and timing. Commercial satellite services reduce the monopoly once held by major powers, but they also create dependency on foreign constellations and ground infrastructure. By 2036, resilient multi-orbit communications and rapid access to commercial imagery may be as important as owning a small national satellite.

AI will most plausibly support data triage, anomaly detection, route planning, maintenance prediction, sensor correlation and decision support. It should not be imagined as an autonomous strategic commander. Training data, adversarial deception, explainability and human authority will determine whether automation accelerates sound decisions or merely automates error.

Electronic warfare affects every stage of the kill chain. Jamming can reduce radar range or break data links, while deception can create false targets and incorrect confidence. Passive electronic support can locate emitters without revealing the observer. The most effective EW is usually integrated with manoeuvre and weapons rather than applied as a separate activity.

Cyber operations add uncertainty but are often exaggerated in public. Website defacements and denial-of-service attacks are not equivalent to penetrating military command networks. More serious possibilities include corrupting logistics data, attacking satellite ground stations, manipulating identification systems or disrupting civilian infrastructure during a crisis. Stimson and RUSI analyses warn that cyber effects can be difficult to attribute and may create escalatory pressure if leaders misinterpret technical failure as deliberate attack.

Space services will become increasingly important through 2036. Neither side needs a giant independent constellation to gain value. Commercial imagery, allied data, navigation augmentation and resilient communications can improve targeting and battle-damage assessment. At the same time, dependence on space creates vulnerabilities to jamming, dazzling, cyber intrusion and diplomatic restrictions on foreign data access.

Electronic warfare and cyber operations interact with physical combat. Jamming can reduce radar range, disrupt navigation or interfere with links, while cyber access can corrupt logistics, planning or situational awareness. Public claims of total network penetration are usually difficult to verify and are often part of information warfare. A mature assessment assumes that both sides can achieve temporary local effects but that well-designed military networks use encryption, segmentation, alternative communications and manual fallbacks.

Space support is increasingly relevant through imagery, communications, weather data, navigation and signals intelligence. Pakistan benefits from Chinese launch and satellite cooperation while developing national assets; India has a larger indigenous space programme and more extensive launch capability. Neither side should assume uninterrupted access. Satellites can be jammed, spoofed or politically restricted, and commercial imagery is available to multiple actors. Resilient forces combine space data with airborne and ground sensors rather than treating satellites as an infallible source.

Technology and operational effect

Electronic warfare as a contest of confidence

Electronic warfare is often described as simply jamming a radar. The more sophisticated objective is to influence the opponent's confidence: make a real track appear uncertain, create false targets, delay a message, force an emitter to change mode or reveal a hidden sensor. Noise jamming can deny information but also announces the jammer's presence. Deception may be more valuable because the victim continues to operate while making the wrong decision.

Aircraft self-protection suites combine radar warning, electronic support, missile warning, expendables and active jamming. Stand-off jammers operate farther away with more power but are high-value targets. Escort jammers accept greater risk to remain close to the strike package. Unmanned jammers and decoys may become the most affordable way to create mass.

Cyber operations and mission systems

The most dangerous cyber targets are not necessarily public websites. Mission-planning systems, maintenance databases, identity services, satellite ground stations, logistics software and software-update chains can affect sortie generation without producing dramatic public evidence. A corrupted mission-data file can cause a radar mode to misclassify an emitter; a compromised maintenance system can ground aircraft through uncertainty.

Resilience requires network segmentation, strong identity, signed software, offline recovery, alternate communications and realistic red-team exercises. Both Pakistan and India depend on foreign subsystems, creating

supply-chain risks and limits on source-code access. Indigenous integration capacity therefore has operational as well as industrial value.

Space, navigation and timing

Satellite imagery supports target development and battle-damage assessment, but revisit time, cloud, resolution and analyst capacity limit its value. Commercial constellations make imagery more accessible, while synthetic-aperture radar can see through cloud and darkness. Secure communications and navigation are equally important. Jamming or spoofing satellite navigation can affect drones, cruise missiles and timing-sensitive networks.

A resilient force combines several navigation sources: satellite signals, inertial systems, terrain matching, celestial or visual updates and local timing. Small national satellites can provide sovereign access, but partnerships and commercial services may supply greater coverage. Dependence should be managed rather than imagined away.

Information warfare and the evidence problem

Every major claim in 2019 and 2025 was also a weapon in an information contest. Images of debris, radar plots, satellite pictures and pilot statements were selected to support national narratives. Reuters later reported allegations that China used manipulated or unrelated images to harm Rafale's reputation; China denied the allegation.[26] Similar misinformation circulated from many sources on both sides.

A Pakistani-centred assessment does not need weak evidence. Pakistan's strongest case rests on the confirmed or strongly supported parts: the 2019 captured pilot and unresolved F-16 claim; the 2025 U.S.-official assessment of at least two Indian aircraft losses; and the reported coherence of the PAF kill chain. Inflating evidence can reduce the credibility of these genuine achievements.

Electronic support and the construction of an enemy picture

Electronic-support measures detect, classify and locate hostile emissions. Over time, analysts build an electronic order of battle linking radar modes, communication patterns and platform behaviour. This information supports route planning, jamming and targeting. A force that changes waveforms and procedures can make the database less reliable; a force that repeats peacetime patterns gives the opponent a valuable template.

Pakistan's emphasis on integrated electronic-warfare and air-defence training is particularly relevant because it cannot absorb prolonged disruption of a small number of key nodes. India possesses a broader set of national technical resources and platforms, but integrating data from diverse systems remains demanding. The electromagnetic contest begins before weapons are fired and continues throughout mobilisation, patrol and recovery.

Cyber operations and mission-system resilience

Cyber effects in an air campaign are more likely to target logistics, communications, planning networks and public information than to produce dramatic remote control of an enemy fighter. Disrupting fuel records, maintenance scheduling, air-tasking distribution or civilian communications can slow operations and create confusion. Defensive cyber practice therefore includes segmentation, offline procedures, authenticated updates and rehearsed recovery.

Mission systems and data libraries require special protection. Radar-warning receivers and jammers depend on current threat parameters. Compromised or outdated libraries can cause a crew to misclassify a signal or select an ineffective response. Software assurance and rapid reprogramming will become increasingly important through 2036.

Space support and the information contest

Satellites provide navigation, timing, communications, weather and imagery. Neither Pakistan nor India possesses an unlimited sovereign constellation, so both rely on combinations of national, commercial and partner capabilities. Commercial imagery makes concealment harder and allows outside analysts to examine damage claims within hours. This improves transparency but can also create false certainty when imagery is incomplete or misinterpreted.

Information operations attempt to shape domestic morale, international opinion and adversary decision-making. The May 2025 conflict generated competing claims, recycled imagery and commercial narratives around Chinese and Western weapons. A credible analysis must resist both denial and exaggeration. Strategic communication is most effective when it is consistent with evidence that later survives scrutiny.

Chapter source notes

[26] **Reuters**. U.S. commission alleges Chinese campaign to discredit Rafale after the 2025 conflict; China denies. 20 November 2025. [Source](#)

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CHAPTER 10

Drones, Loitering Munitions and Manned-Unmanned Teaming

Why affordable unmanned mass may mature faster than new manned fighter programmes.

CHAPTER ARGUMENT

The cheapest useful drone may never carry an explosive warhead. It can map radar emissions, relay data over terrain, stimulate an air-defence response, confirm whether a runway is usable or provide a terminal update to another weapon. A swarm can distribute these roles among many vehicles so that the loss of one does not end the mission.

KEY THEMES mass | autonomy | cost exchange

Drones provide persistent surveillance, cheap target stimulation, communications relay, electronic support and strike. Their strategic value often lies in forcing the defender to reveal radars or expend expensive interceptors. Larger unmanned aircraft can carry sensors and weapons; smaller systems can create mass and uncertainty.

The 2025 conflict demonstrated that drones serve several purposes beyond direct destruction. They can collect imagery, stimulate radar emissions, test reaction times, carry jammers, deliver small warheads and force a defender to spend expensive interceptors. Even a drone that is shot down may succeed if it reveals a radar location or exhausts attention. Large numbers create a classification problem in which the defender must distinguish decoys from dangerous weapons.

Pakistan operates Chinese, Turkish and indigenous unmanned systems and has publicised cooperation with Turkey in advanced drones. India uses Israeli-origin systems, indigenous platforms, loitering munitions and has contracted for MQ-9B aircraft. India also possesses a larger commercial technology and space base that can support imagery, communications and navigation. Pakistan seeks to offset the disparity through Chinese cooperation, smaller satellites and focused military integration.

Drones have reduced the cost of persistent surveillance and created new ways to probe air defences. Pakistan operates Chinese, Turkish and indigenous systems, while India is expanding domestic and foreign drone programmes. Large MALE aircraft can carry sensors and weapons over long distances; smaller drones can act as decoys, communications relays or expendable reconnaissance platforms. Their greatest value may lie in forcing expensive systems to reveal themselves or expend scarce interceptors.

The drone as sensor, decoy and communications node

The cheapest useful drone may never carry an explosive warhead. It can map radar emissions, relay data over terrain, stimulate an air-defence response, confirm whether a runway is usable or provide a terminal update to another weapon. A swarm can distribute these roles among many vehicles so that the loss of one does not end the mission.

Pakistan and India both used drones during the May 2025 conflict, but public accounts differed sharply on numbers and effects. The more durable lesson is that air defence must handle a mixed raid: slow drones, fast missiles, decoys and manned aircraft arriving from different directions. Expensive missiles cannot be the default response to every small target.

Loitering munitions and counter-air operations

Loitering munitions can wait near a suspected radar or launcher location and attack when the system emits or moves. Against air bases, they can threaten exposed aircraft, fuel points, antennas and repair teams after the main strike. Their limited warhead means they are most effective against vulnerable components rather than hardened structures.

Defence requires passive detection, electronic warfare, guns, low-cost interceptors, camouflage and strict emission discipline. The objective is to preserve high-end surface-to-air missiles for aircraft and cruise missiles while defeating drones at lower cost.

Manned-unmanned teaming

A manned fighter can assign reconnaissance, jamming, decoy or weapon-carrying tasks to collaborative aircraft. The unmanned platforms extend sensor baselines and magazine depth without exposing a pilot. The difficult part is not aerodynamic control; it is trusted autonomy under jamming, secure task allocation, identification and legal authority for lethal action.

Pakistan's access to Chinese and Turkish unmanned ecosystems could accelerate experimentation. India has a broader domestic technology base and official collaborative long-range saturation programmes, but must convert demonstrations into reliable production.[24][28] By 2036, both may field useful unmanned teammates even if their most ambitious fifth-generation manned aircraft remain limited in number.

The economics of unmanned mass

Attritable does not mean disposable. Engines, seekers, data links and trained operators still cost money, and a sophisticated drone can approach the cost of a crewed trainer. The rational mix includes very cheap decoys, recoverable sensor drones, specialised electronic-attack platforms and a smaller number of high-performance collaborative aircraft. Production capacity and software updates will matter more than a single spectacular prototype.

Unmanned systems across the kill chain

Drones can perform surveillance, communication relay, electronic support, decoy, strike and battle-damage assessment. Their value is not limited to sophisticated long-endurance aircraft. Small expendable systems can force radars to activate, reveal air-defence positions and impose an unfavourable cost exchange when expensive missiles are used against cheap targets. Larger systems provide endurance but are easier to detect and require protected control links.

Pakistan and India are both expanding unmanned portfolios because drones can be fielded more rapidly than new fighter fleets. The decisive issue will be integration: whether drone tracks enter the common picture, whether operators can hand targets to fighters or artillery and whether communications remain reliable under jamming.

Loitering munitions, saturation and counter-UAS

Loitering munitions blur the boundary between aircraft and missile. They can wait for a target, approach from multiple directions and strike radars, vehicles or exposed infrastructure. Saturation does not require every weapon to penetrate. A mixed raid of decoys, reconnaissance drones, cruise missiles and loitering munitions can overload identification and engagement capacity, causing the defender to waste interceptors or expose sensors.

Counter-UAS therefore requires layers: passive detection, electronic attack, guns, short-range missiles and disciplined rules for when to engage. No single solution is economical against every threat. The defender must reserve high-end missiles for high-end targets while using cheaper systems against small drones.

Manned-unmanned teaming and the 2030s

Collaborative combat aircraft may carry sensors, jammers or weapons ahead of crewed fighters. Their promise is to distribute risk and increase mass. Their limitations include communications, autonomy assurance, identification and cost growth. A system marketed as expendable can become too expensive to lose once sophisticated sensors and engines are added.

Pakistan may benefit from focused cooperation with China and Turkey, while India can draw on a larger domestic technology base and multiple international relationships. The first operationally useful systems are likely to perform narrow missions - relay, decoy, electronic attack or additional missile carriage - rather than autonomous dogfighting. Training and command concepts will determine whether they become force multipliers or additional burdens.

OPERATIONAL IMPLICATION

The first force to produce reliable unmanned mass at acceptable cost may gain more practical advantage than the first force to reveal a prestigious manned prototype.

Chapter source notes

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CHAPTER 11

Pakistan 2026-2030

JF-17 growth, J-10CE consolidation, the J-35 offer, support assets and the realistic meaning of PFX.

CHAPTER ARGUMENT

The most credible near-term pathway is evolutionary. JF-17 Block III becomes the numerical modern backbone; J-10CE remains the high-end non-stealth air-combat node; F-16s are retained where their training and weapons remain valuable; and older Mirage and F-7 fleets decline. Support assets, ground radar, electronic warfare, hardened infrastructure and missile stocks may produce more combat value than purchasing a small prestige fleet without the necessary ecosystem.

KEY THEMES JF-17 | J-10CE | J-35 | PFX

PAF vs IAF 2026-2036

Capabilities, Concepts, Procurement, Scenarios

صلاحیتیں، نظریات، خریداری اور منظر نامے

The J-35 Factor

جے 35-عنصر



Imagery-based assessment: final export configuration may differ.

تصاویر پر مبنی تخمینہ: حتمی برآمدی ترتیب مختلف ہو سکتی ہے۔

06

Visual Plate V. The J-35 factor. This previously generated conceptual plate identifies visible design cues and possible operational implications; export configuration remains uncertain.



Figure 11.1. CCTV documentary still showing a J-35 with media labels for PL-10, CM-98 and six PL-15/PL-16 weapons. It indicates the roles being presented; it does not independently verify the final export loadout.

What is confirmed, reported and speculative

Confirmed: Pakistan continues to operate and develop the JF-17 family, has inducted the J-10CE, and has demonstrated a growing mix of airborne warning, drones, long-range missiles and network-centric exercise concepts. The JF-17 export contract with Azerbaijan also gives the production ecosystem an external customer.

Reported offer: Janes reported that Pakistan announced a Chinese offer including 40 J-35 aircraft. CCTV footage in May 2026 showed a J-35 marked 0001, and Chinese commentary suggested export-market relevance. Neither item publicly establishes a Pakistani contract, delivery date, training detachment or operational squadron.

Speculative: detailed four-block PFX roadmaps, a guaranteed indigenous engine by a particular year, and automatic transfer of J-35 or KAAAN technology are not supported by robust public documentation. PFX is best analysed as an ambition for indigenous design and integration whose practical form may be incremental.

The likely Pakistani force design by 2030

The most credible outcome is a two-tier force: JF-17 Block III as the numerical modern backbone, J-10CE as a higher-end air-combat and strike node, surviving F-16s retained for specialised missions, and older Mirage/F-7 families progressively reduced. Network, missile and electronic-warfare improvements may create more effect than a small number of prestige aircraft.

If J-35 is contracted and delivered, an initial unit would probably serve as a sensor, penetration and high-value-target threat rather than replace the fleet. The strategic value would come from integration with airborne warning, passive sensors, long-range missiles and conventional fighters. A ceremonial handover would not equal a combat-ready squadron.

The most reliable Pakistani pathway to 2030 is continued JF-17 Block III production, retirement of older fighters, consolidation of J-10CE operations and expansion of drones, radars, weapons and command systems. These are extensions of programmes already visible in service. Additional J-10CE aircraft are plausible but should be treated as reported until a public contract or delivery is confirmed.

China publicly offered J-35 fighters, KJ-500 AEW&C aircraft and HQ-19 systems to Pakistan in 2025. The offer is strategically significant because it signals willingness to provide a fifth-generation pathway and higher-tier network nodes. It does not prove that forty J-35s are contracted, paid for or deliverable on a particular date. A first aircraft could be transferred before a complete squadron becomes operational, but combat integration would require pilot conversion, low-observable maintenance, mission data, secure links, weapons, shelters and a new sustainment system.

A small J-35 force could still be influential. It could perform covert sensing, threaten airborne warning and tanker assets, escort strike packages, cue long-range missiles and serve as a pathfinder for non-stealth fighters. The

greatest value would arise if it were integrated with KJ-500, ground sensors and long-range weapons. Without that network and adequate availability, it would become an expensive symbol rather than a decisive capability.

The PFX concept is strategically attractive but publicly underdefined. Pakistani presentations have associated it with a future fighter and deeper local capability, but authoritative evidence does not yet confirm the detailed four-block roadmap sometimes circulated in media and commentary. A realistic pathway would begin with technologies that can be absorbed now: mission computers, displays, electronic warfare, composites, flight-control software, radar modules and weapon integration. Developing a reliable modern turbofan is a much longer and more difficult project.

Turkey adds a second external pathway through drones, electronics and possible participation or learning connected to KAAN. This may reduce dependence on a single supplier and expose Pakistani engineers to different design practices. However, KAAN itself depends on foreign engines in its early phase and faces the cost and schedule risks common to fifth-generation programmes. Cooperation is valuable, but it should not be confused with guaranteed access to every technology.

By 2030, the most plausible PAF is a mixed force: larger numbers of JF-17 Block III, one or more J-10CE groups, a sustained F-16 core, fewer Mirages and perhaps an initial stealth unit if the J-35 offer becomes a contract. The network around the aircraft may improve faster than the number of frontline squadrons.

Pakistan's near-term modernisation is likely to prioritise continuity. Additional JF-17 Block III aircraft, weapons stocks, electronic warfare and dispersed infrastructure can be absorbed more reliably than an entirely new fleet. More J-10CE aircraft would increase high-end BVR capacity and simplify tactics built around Chinese sensors and missiles. These steps may produce greater operational value before 2030 than a premature attempt to field a fully indigenous fifth-generation fighter.

The reported J-35 pathway would change force design even in small numbers. A stealth unit could collect information closer to defended airspace, threaten support aircraft and create ambiguity about the location of shooters. Its operational value would depend on low-observable maintenance, mission-data preparation and secure integration with existing PAF networks. Delivery of airframes alone would not establish these capabilities. The KJ-500 offer may be equally important because it would provide a larger command node for the rest of the force.

PFX should be treated as an industrial roadmap rather than a promised aircraft specification. A credible first stage could use a larger airframe or extensive JF-17-derived systems to develop avionics, software, composites and weapons integration. Later stages could increase signature reduction and local content. A fully Pakistani modern turbofan by the mid-2030s would be an extremely ambitious objective; cooperation with China or Turkey is more plausible than complete independent development in the near term. The project will succeed if each stage delivers usable engineering capacity, not if it merely changes marketing labels.

J-35 marked 0001 in May 2026 Chinese media footage: an export-market signal, not proof of Pakistani ownership.

Evidence grading of the Pakistani pathway

The credible Pakistani pathway

The most credible near-term pathway is evolutionary. JF-17 Block III becomes the numerical modern backbone; J-10CE remains the high-end non-stealth air-combat node; F-16s are retained where their training and weapons remain valuable; and older Mirage and F-7 fleets decline. Support assets, ground radar, electronic warfare, hardened infrastructure and missile stocks may produce more combat value than purchasing a small prestige fleet without the necessary ecosystem.

The JF-17 programme gives Pakistan a domestic final-assembly, maintenance and integration base and an export customer in Azerbaijan.[20] It does not provide complete propulsion or sensor sovereignty, but it reduces replacement cost and creates engineers, test pilots and production knowledge. Incremental blocks are strategically safer than waiting for one perfect indigenous fighter.

The J-35 offer: what can be said responsibly

Janes reported that China offered Pakistan 40 J-35 aircraft as part of a broader package.[10] In May 2026, Chinese state media showed an aircraft marked 0001 with AVIC branding, and commentary suggested an export role.[11] These developments demonstrate that an export pathway is being signalled. They do not publicly prove a signed Pakistani contract, exact configuration, delivery schedule or operational squadron.

The CCTV documentary image shown in this book labels six PL-15/PL-16 weapons, PL-10 and a CM-98 anti-radiation weapon. It suggests the roles China wants associated with the aircraft: internal BVR carriage, close-combat capability and suppression of enemy air defences. The labels should be read as media presentation, not as independent certification that every weapon is internally integrated or operational on the export version.

If Pakistan receives an initial J-35 unit, its greatest value would be as a sensor and penetration element inside the existing network. It could threaten high-value support aircraft, generate tracks for J-10CE and JF-17 shooters, conduct selective SEAD and force India to invest in passive counter-stealth coverage. A ceremonial handover would not equal combat readiness; pilot conversion, mission data, weapons clearance, low-observable maintenance and tactics development could take much longer.

KJ-500, HQ-19 and package logic

The reported Chinese offer also included KJ-500 airborne warning and HQ-19 missile defence. The combination is more strategically significant than the fighter alone because it points toward a complete Chinese-origin high-end architecture: sensing, battle management, low-observable aircraft, long-range weapons and strategic air defence. As of August 2026, these should be discussed as reported offers rather than confirmed Pakistani operational assets.

Pakistan's acquisition choices will be constrained by finance. A smaller number of J-35s supported by additional AEW&C, missiles, shelters and training may be more effective than a larger headline order with weak sustainment. Combat experience in 2025 strengthens Pakistan's bargaining position with Chinese industry, but it does not remove cost, export-configuration or dependency questions.

PFX as a realistic ambition

Public evidence supports Pakistani interest in a future indigenous fighter ecosystem, but not the detailed multi-block timelines often circulated online. PFX should be understood as a national framework for design, avionics, manufacturing, software, unmanned teaming and future fighter requirements. Its early success may appear as upgraded JF-17 subsystems, test facilities, composites, mission computers or collaborative drones rather than a clean-sheet fifth-generation aircraft.

A credible pathway would protect engineering continuity, partner with China or Turkey selectively, and avoid claiming an indigenous engine before the materials, testing and production base exists. Industrial autonomy grows through verified subsystems and production competence, not through programme names.

JF-17 Block III as the practical centre of gravity

Between 2026 and 2030, Pakistan's most dependable modernisation path is continued JF-17 Block III production, weapon integration and fleet conversion. This programme offers a combination of affordability, local support and sufficient capability to replace ageing aircraft. The key measures of success will be annual delivery rate, serviceability, pilot conversion and missile inventory rather than ceremonial rollout numbers.

Further improvements could include electronic-warfare updates, improved passive sensors, new stand-off weapons and deeper network integration. The aircraft's smaller size and payload impose limits, but those limits can be managed through role specialisation and support from J-10CE, AEW&C and ground-based sensors.

J-10CE consolidation and the conditions for J-35 value

The J-10CE fleet provides Pakistan with a high-end non-stealth node. Expanding training, spares and weapons around the existing fleet may offer more immediate operational return than acquiring a small number of unfamiliar aircraft. The J-35 offer is strategically significant, but a stealth fighter becomes useful only with

mission data, trained pilots, low-observable maintenance, suitable weapons and a network that can exploit its sensing and penetration advantages.

An early ceremonial handover would not equal an operational squadron. Pakistan would need acceptance testing, instructor development, ground-support equipment, secure facilities and tactics for mixed operations with J-10CE and JF-17. If those steps are completed, even a limited J-35 force could act as a forward sensor, selective penetrator and high-value-target threat. Without them, it would be a costly symbol.

KJ-500, long-range weapons and the realism of PFX

A KJ-500-class aircraft could increase battle-management capacity and provide a stronger full-circle surveillance node, but it would also become a priority target requiring fighter and electronic protection. Long-range air-to-air weapons may allow Pakistan to threaten Indian tankers and AEW&C aircraft, yet such employment demands highly reliable identification and offboard tracking.

PFX should be understood as a long-term national capability framework rather than a confirmed sequence of aircraft blocks. The credible objectives are growth in design, software, integration, test and manufacturing competence. A clean-sheet fifth-generation fighter and indigenous engine are exceptionally demanding. Pakistan can still gain substantial autonomy by controlling mission computers, data links, weapons integration and maintenance even when major subsystems remain foreign.

Pakistan procurement status, August 2026

Programme / capability	Status in open sources, August 2026	Assessment
JF-17 Block III	Operational production and export pathway	Most credible source of modern fleet mass
J-10CE	Operational	High-end BVR and strike node; combat reputation strengthened in 2025
J-35	Chinese offer reported; export signalling visible; contract/delivery not publicly confirmed	Potentially transformative only if supported by training, weapons, AEW&C and sustainment
KJ-500 / HQ-19	Reported elements of a Chinese offer	Discuss as offered, not inducted
PFX	Public ambition with limited verified programme detail	Best treated as a long-term design and integration framework
Drones / EW / space	Active growth across several programmes	Likely to deliver usable capability faster than a clean-sheet fighter

Chapter source notes

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[11] **Global Times / CCTV**. J-35 with 0001 fuselage number spotted; expert suggests export-market role. 8 May 2026. [Source](#)

[20] **Reuters**. Pakistan signs contract to sell JF-17 Block III fighters to Azerbaijan. 26 September 2024. [Source](#)

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CHAPTER 12

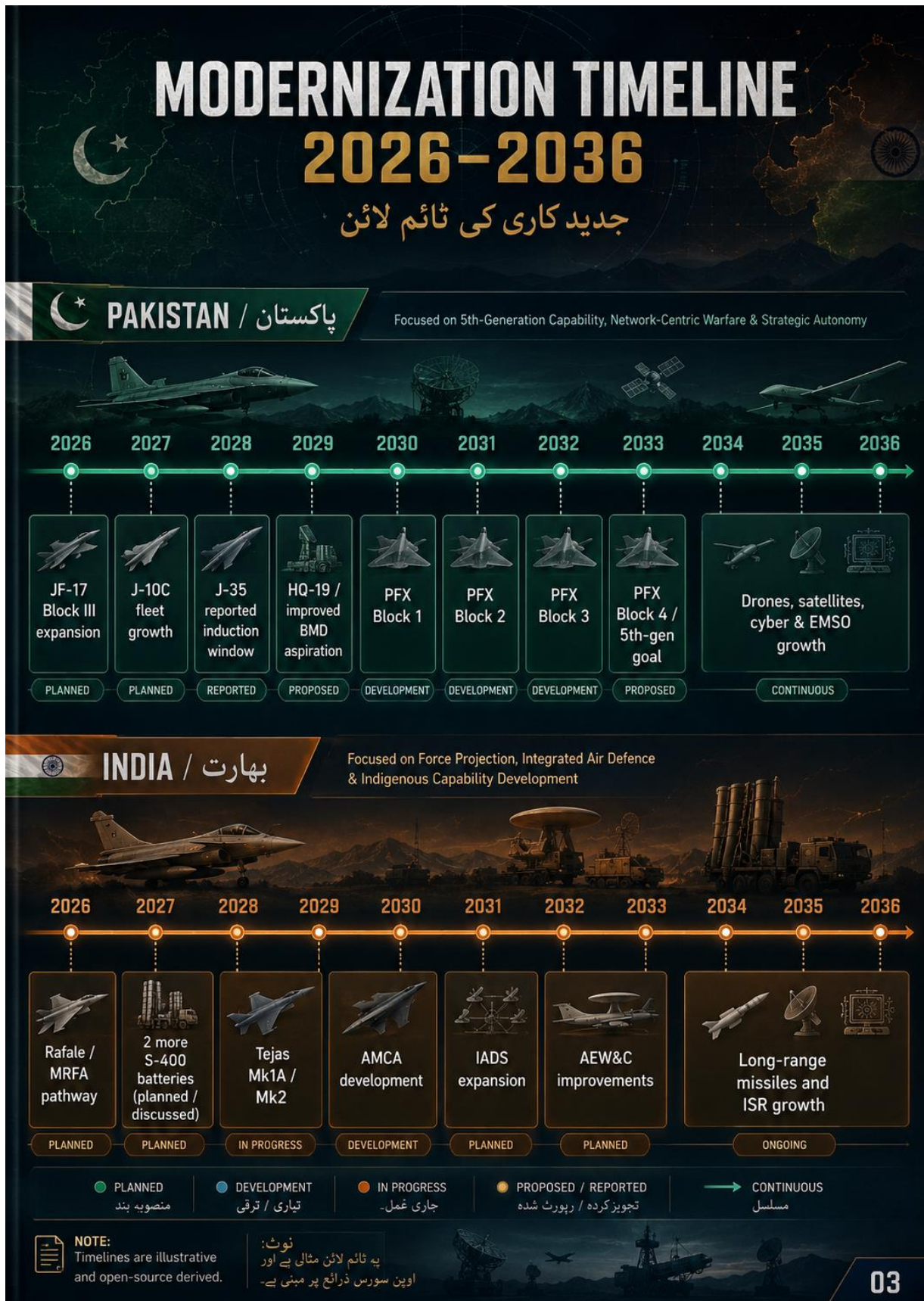
India 2026-2030

Rafale expansion, Tejas production, Super Sukhoi, AEW&C and the execution challenge.

CHAPTER ARGUMENT

India gave initial approval in February 2026 for a large package including 114 additional Rafales.[13] France and India announced ambitions for extensive local production, and Dassault said in July that negotiations were continuing after India issued a formal request in June.[14][25] The pathway is politically advanced, but price, workshare, weapons, engine arrangements, training and delivery sequencing remain decisive.

KEY THEMES Rafale | Tejas | Su-30MKI | AMCA



Visual Plate VI. A conceptual 2026-2036 modernisation timeline. Reported offers and projections are not presented as contracted delivery schedules.

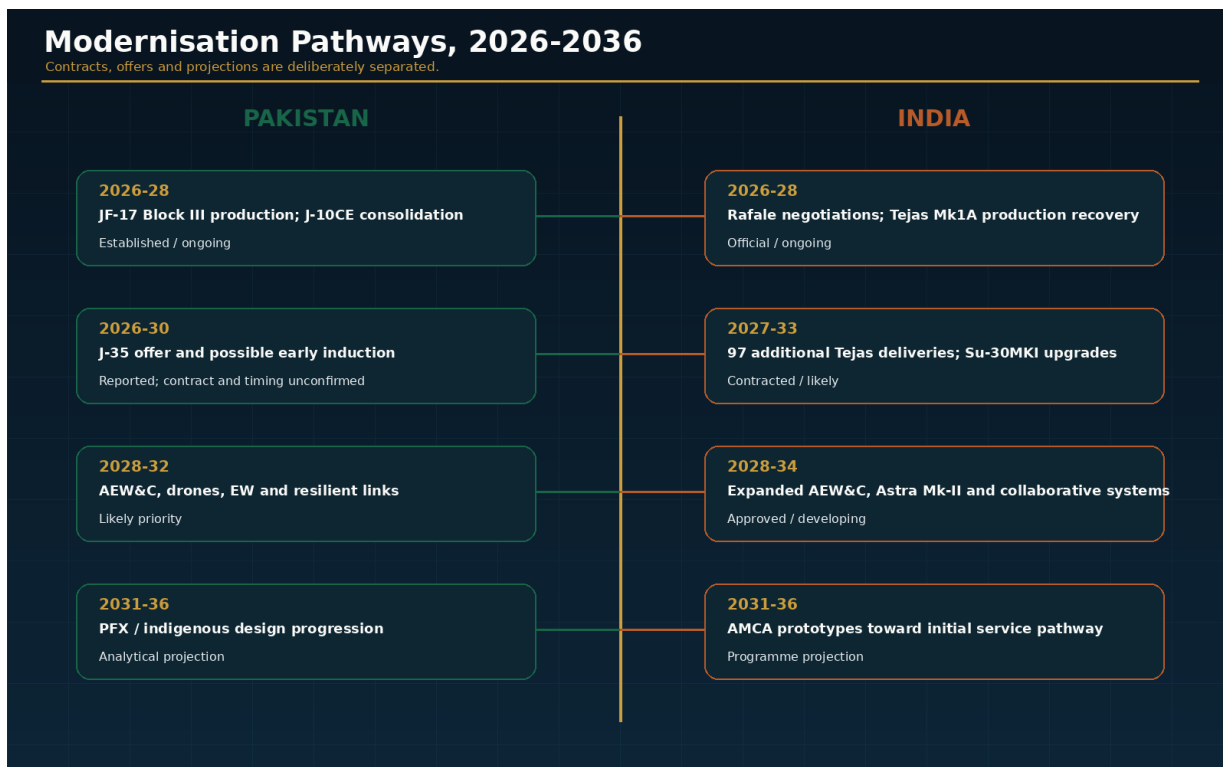


Figure 12.1. Modernisation pathways. The diagram distinguishes ongoing programmes from reported offers and analytical projections.

The Rafale pathway as of August 2026

India approved the broad procurement in February 2026, issued a formal request to France in June and remained in negotiation in July. The programme could ultimately transform squadron strength and local production, but contract signature, industrial workshare, weapons, training and delivery sequencing will determine when it changes the operational balance.

Rafale expansion is lower risk than introducing a completely new type because the IAF already operates the aircraft and its weapons. Even so, 114 aircraft cannot appear quickly; India must bridge the gap through Su-30MKI modernisation, Mirage 2000 and MiG-29 sustainment, Tejas delivery and better availability.

Tejas and AMCA: production is strategy

India contracted for 97 additional Tejas Mk1A aircraft in September 2025, taking Mk1A orders to 180. The key question is no longer whether the aircraft exists, but whether engines, private-sector structures, testing and HAL production lines can generate reliable annual output.

The AMCA execution model was approved in May 2025 with competitive industry participation and five planned prototypes before series production. This is an important institutional step, but prototype approval is not squadron service. Low-observable manufacturing, mission software, propulsion and weapons integration will control the timetable.

India gave preliminary approval in February 2026 for a major package including 114 additional Rafales. France and India stated an intention to co-produce a large share in India, but technical and commercial negotiations remained necessary. This means the decision is strategically important without creating immediate squadrons. Industrial preparation, contracting, local production and training will spread delivery over years.

Rafale offers India a low-risk operational solution because the IAF already flies the type. Additional aircraft would expand weapons commonality, training and electronic-warfare capacity. Local fuselage and possible engine assembly can strengthen the industrial base. The disadvantages are high cost, continuing dependence on French design authority and the time required to build a new production ecosystem.

Tejas Mk1A is essential to numerical recovery. India has large orders, but GE engine supply and production execution have delayed deliveries. If HAL and private suppliers increase output, Tejas can replace retired MiG-21

units and release heavier fighters for demanding missions. Failure to accelerate production would deepen the squadron trough and increase pressure to buy more imported aircraft.

The Su-30MKI upgrade is the bridge between current and future fleets. New radars, electronic warfare, indigenous weapons and mission systems could keep the aircraft effective through the 2030s. India must also improve availability and reduce dependence on Russian supply. The large Su-30 fleet means even a partial upgrade can generate substantial combat mass.

India is expanding AEW&C, tanking, air defence and long-range weapons. These enablers may produce more operational value than a simple increase in fighter numbers. The central requirement is to integrate Rafale, Su-30, Tejas, ground radars, satellites and missiles into a shared picture with reliable identification and secure links. The 2025 opening losses gave urgency to this task.

By 2030, India is likely to remain in transition: Rafale negotiations or early production, growing Tejas output, upgraded Su-30 units and continued dependence on older Mirage, MiG-29 and Jaguar fleets. It will still possess larger total capacity than Pakistan, but the quality of local integration and readiness will determine how much of that capacity is usable in the first days of a crisis.

India's central problem to 2030 is the retirement-production gap. Older MiG-21s have left service and other legacy fleets will decline, while Tejas Mk1A deliveries and a major Rafale programme require time. The 114-Rafale decision gives strategic direction, but initial clearance and political announcement are not the same as signed production contracts or operational squadrons. Local manufacture can deepen the partnership with France, yet establishing tooling, quality control and supply chains takes years.

The most important near-term multiplier may be the Su-30MKI upgrade. India already owns a large fleet, trained personnel and infrastructure. Improved AESA radars, mission computers, electronic warfare and indigenous missiles could generate substantial capability without waiting for an entirely new aircraft. The upgrade must also address availability, engine support and the complexity of integrating Indian and foreign systems.

Tejas remains essential because an air force cannot maintain mass using only expensive heavy and medium fighters. Mk1A must become a predictable production programme, while Mk2 development must avoid absorbing resources without delivering aircraft. India has the financial capacity to pursue Rafale, Tejas and AMCA together, but management capacity and engineering manpower are finite. The success of the approach will be measured by annual delivered and combat-ready aircraft, not by the total value of approvals.

Status of major Indian 2026-2030 programmes

Rafale expansion: a major programme, not an instant fleet

India gave initial approval in February 2026 for a large package including 114 additional Rafales.[13] France and India announced ambitions for extensive local production, and Dassault said in July that negotiations were continuing after India issued a formal request in June.[14][25] The pathway is politically advanced, but price, workshare, weapons, engine arrangements, training and delivery sequencing remain decisive.

Rafale expansion carries less operational risk than introducing a new type because India already operates the aircraft. Common training, weapons and support can increase availability. The strategic effect will still arrive gradually. Even after contract signature, factories, suppliers and pilots require years to generate several combat-ready squadrons.

Tejas Mk1A and the production challenge

India contracted 97 additional Tejas Mk1A aircraft in September 2025, bringing Mk1A orders to roughly 180.[15] Official plans state deliveries of the additional batch are to begin in 2027-28 and continue over six years. HAL opened a third production line and announced aggregate capacity ambitions, while GE engine deliveries remained a pacing factor.[24]

Tejas should not be dismissed because of delays or one accident. Its long-term importance lies in creating an indigenous design, production and upgrade base. The immediate operational problem is timing: India needs reliable annual deliveries before older fleets retire. The aircraft's value will depend on serviceability, radar and electronic-warfare maturity, Astra integration and the rate at which units reach full operational capability.

Super Sukhoi and the bridge to AMCA

Su-30MKI is likely to remain India's numerical heavy-fighter core into the 2030s. Radar, mission-computer, electronic-warfare and weapon upgrades can restore relevance and improve compatibility with Indian sensors and missiles. The challenge is fleet availability and the cost of upgrading a large inventory while maintaining daily readiness.

The AMCA execution model approved in May 2025 invites public and private Indian industry to compete or form consortia.[16] This is an important institutional reform. It is not equivalent to an operational fifth-generation fleet. Five prototypes, low-observable manufacturing, engine selection, sensor fusion and weapons integration must precede series production. A realistic 2036 assessment ranges from advanced testing to limited early service, rather than assuming a large mature fleet.

India's integration burden and opportunity

India's multi-origin inventory complicates common mission data, secure links and sustainment, but it also provides technological choice and resistance to a single supplier cutoff. The solution is not necessarily complete standardisation. It is a sovereign command layer that can receive and distribute tracks without exposing every platform's proprietary systems. Indigenous AEW&C, software-defined radios, data-fusion centres and common weapons can gradually turn diversity into resilience.

Rafale expansion and the time between approval and combat power

A programme for up to 114 additional Rafales would materially increase India's high-end capacity, but approval, negotiation, local production and squadron conversion take years. The strategic value lies not only in aircraft numbers but in a standardised weapons and electronic-warfare ecosystem. Local fuselage and production arrangements could strengthen sustainment if they mature into reliable throughput.

Until significant deliveries occur, the existing Rafale fleet remains a scarce asset that must cover multiple missions. India will need to protect it, maintain missile stocks and integrate it more fully with AEW&C and ground networks. The 2025 loss demonstrates that high-quality aircraft cannot compensate for incomplete situational awareness.

Tejas production and the Super Sukhoi bridge

Tejas Mk1A is essential because the IAF must replace ageing MiG-21-era force structure and rebuild squadron numbers. The programme's strategic test is industrial: engines, radar, electronic warfare, quality control and delivery tempo. An aircraft delivered late cannot fill an operational gap, regardless of its planned specifications.

The Su-30MKI will remain the mass of India's heavy fighter force. Upgrades to radar, weapons, electronic warfare and mission computing could produce a powerful bridge to future aircraft. However, the programme must improve availability and manage the complexity of modifying a large fleet. A modernised Su-30MKI paired with indigenous missiles and better networking may affect the near-term balance more than an early AMCA prototype.

AEW&C expansion, AMCA and joint integration

India's shortage of airborne early-warning coverage has long been recognised. Additional Netra variants and larger platforms could improve persistence across the western and northern fronts. The challenge is to create sufficient crews, maintenance and protected orbits, not merely acquire airframes.

AMCA is a strategically important effort to establish indigenous low-observable design and systems integration. Its operational impact before 2036 is uncertain because prototype flight, weapons testing, production tooling and squadron conversion are sequential. India may nevertheless gain valuable technologies before a full fleet appears. The broader requirement is joint integration across the Air Force, Army air defence, Navy, space and cyber organisations. Scale becomes decisive only when the information system can coordinate it.

India procurement status, August 2026

Programme / capability	Status in open sources, August 2026	Assessment
114 Rafale pathway	Initial approval; formal request issued; negotiations continuing	Major strategic programme, but contract and delivery sequence remain critical
Tejas Mk1A	180 ordered in total; additional 97 contracted; production recovery underway	Essential replacement mass and industrial bridge
Su-30MKI upgrade	Large fleet with modernisation priority	Most important near-term heavy-fighter bridge
AMCA	Execution model approved; prototype programme ahead	Strategically important but not yet an operational fleet
AEW&C expansion	Acquisition approvals and indigenous development	Necessary to convert fighter mass into an integrated picture
Astra / stand-off weapons	Domestic development and integration expanding	Reduces supply dependence and increases magazine depth

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CHAPTER 13

Industry, Economics, Readiness and Sustainment

Why delivered aircraft, trained crews, repair capacity and missile stocks matter more than budget headlines.

CHAPTER ARGUMENT

SIPRI estimated a very large gap between Indian and Pakistani military expenditure in 2025.[19] That gap matters for infrastructure, stockpiles, research and a prolonged war. It does not directly predict the result of a one-hour air engagement. Money must pass through procurement, production, acceptance, training and maintenance before it becomes usable combat power.

KEY THEMES production | serviceability | stockpiles

Economics and industrial tempo

SIPRI estimated Indian military expenditure at \$92.1 billion in 2025 and Pakistan's at \$11.9 billion. The structural gap shapes inventory, infrastructure, research, strategic transport and the capacity to absorb a long war. It does not, by itself, measure readiness or the effectiveness of a specific mission package.

India's advantage depends on converting budget into delivered aircraft, engines, missiles, shelters, maintenance capacity and trained crews. Pakistan's problem is the opposite: it can generate coherent selective capability but has less margin for attrition, stockpile depletion and supply interruption.

Industrial sovereignty is not achieved merely by assembling imported kits. It requires design authority, test infrastructure, software access, materials science, propulsion, seeker production, quality control and the ability to repair battle damage. Both countries remain dependent on foreign subsystems in critical areas, especially engines.

Industry and economics

SIPRI estimated India's 2025 military expenditure at \$92.1 billion and Pakistan's at \$11.9 billion. The gap is too large to dismiss. India can finance a larger fleet, more infrastructure, deeper stockpiles and multiple development programmes. Its economy also provides a broader tax and industrial base. Pakistan's 2026-27 federal budget nevertheless increased the defence allocation to three trillion rupees, demonstrating that security remains a priority even under IMF-linked fiscal pressure.

Money does not translate automatically into operational effect. Procurement delays, inefficient maintenance, low availability and fragmented programmes can consume a large budget without generating proportional readiness. India's challenge is execution: turning approvals into delivered aircraft, trained crews, weapons, shelters, links and spare parts. Pakistan's challenge is scarcity: even efficient spending cannot create unlimited depth or replace high-end losses rapidly.

India's industrial strategy is broad. HAL, DRDO, public laboratories and a growing private sector support Tejas, AMCA, missiles, radars, helicopters and space systems. The AMCA execution model deliberately allows public and private companies to compete or form consortia. Dassault and Tata plan Rafale fuselage production in India, while France has discussed local engine assembly. These arrangements can expand skills, but assembly and component manufacture do not necessarily transfer source code or complete design authority.

Pakistan's industrial base is smaller but more concentrated. PAC Kamra produces and supports JF-17 and other aircraft, while domestic organisations work on avionics, drones, weapons and command systems. Export interest in the JF-17 can help sustain production and spread fixed costs. The central risk is that critical engines, seekers,

chips and materials remain externally sourced. A future PFX programme will be credible only if it creates repeatable engineering and test capacity rather than a one-off prototype.

In a prolonged war, repair and replenishment become more important than peacetime specifications. Runway repair materials, spare engines, trained technicians, hardened storage, dispersed fuel and the ability to manufacture simple drones and munitions at scale may determine endurance. India's structural advantage grows with duration; Pakistan's strategy is therefore likely to emphasise early denial, political shock and rapid crisis termination.

The expenditure gap creates a structural advantage for India, but spending must be translated into readiness. Large budgets can be diluted by personnel costs, lengthy procurement, duplicated infrastructure and low availability. Pakistan's smaller budget encourages prioritisation and lower-cost systems, yet it also means that a few high-value losses or a prolonged mobilisation can impose severe economic strain. Neither efficiency nor scale alone guarantees success; the relationship between them determines endurance.

Industrial sovereignty exists in degrees. Producing an airframe locally is different from controlling the engine hot section, radar source code, electronic-warfare libraries, seeker technology and weapons certification. India has greater breadth in laboratories, private companies, missiles and space, while Pakistan has built a focused co-production and integration base around PAC and Chinese cooperation. Both remain dependent on foreign inputs in critical areas.

Future programmes should be judged by repeatability. A national industry becomes strategically valuable when it can design changes, test them safely, manufacture at a predictable rate and repair battle damage without waiting for foreign approval. For Pakistan, PFX credibility will depend on engineering institutions and an achievable engine strategy. For India, AMCA credibility will depend on programme management, prototype testing and production discipline. Announcing a generation label is much easier than building an operational fleet.

Part III - The Balance from 2026 to 2036

Confirmed programmes, reported possibilities and scenario-based assessments of the coming decade.

The operational baseline in 2026

As of 2026, India remains the larger air power in inventory, infrastructure, budget and potential industrial capacity. Its main combat strength rests on the Su-30MKI fleet, supported by Rafale, Mirage 2000, MiG-29, Jaguar and Tejas units. Its network includes Phalcon and Netra airborne warning, IACCS, S-400 and indigenous air-defence systems, BrahMos, Astra and a growing family of precision weapons.

Pakistan fields a smaller but increasingly modernised combat force centred on JF-17, F-16 and J-10CE, with Mirages and remaining F-7 derivatives declining. Erieye and ZDK-03 airborne warning, ground radar networks, HQ-9B/HQ-16 family systems, Il-78 tankers, drones and electronic-warfare assets support the fighter fleet. The exact availability of each type is not public, and nominal aircraft counts should not be confused with combat-ready strength.

India's central near-term weakness is squadron shortage and replacement speed. IISS reported 29 fighter and attack squadrons in early 2026, well below the authorised 42. Pakistan's exact squadron total is less consistently reported, but its force is smaller and has less redundancy. Pakistan may achieve local parity or advantage in a selected sector, yet India retains more total aircraft and bases across the wider theatre.

The 2026 balance is therefore asymmetric rather than equal. Pakistan can credibly deny India an easy air campaign and may gain an opening advantage through preparation and integration. India can absorb more, strike from greater depth and sustain a broader campaign. The risk for India is assuming that aggregate size guarantees local superiority. The risk for Pakistan is assuming that one favourable engagement cancels the opponent's capacity to adapt.

The 2026 inventory balance favours India in total aircraft, base network and strategic depth. The Su-30MKI fleet alone provides a scale Pakistan cannot match with J-10CE or F-16 numbers. India also possesses long-range maritime aviation, heavier transport capacity and a larger missile and space industrial base. These advantages become more important as a conflict widens geographically or continues for weeks.

Pakistan's force is more tightly concentrated on a single principal adversary. Its JF-17 production line, J-10CE fleet, F-16 experience and airborne warning network can be organised around a narrower set of scenarios. This does not erase numerical inferiority, but it can create local density in selected sectors. Pakistan's geographic proximity to many Indian bases and military nodes also gives stand-off weapons shorter routes, while Pakistan's own narrow depth creates equivalent vulnerability.

The balance is best described as Indian superiority in aggregate and Pakistani strength in denial. India can project more mass and has greater capacity to absorb losses. Pakistan can make the opening phase dangerous, threaten high-value enablers and seek rapid political termination. The key uncertainty is readiness: open sources cannot establish how many aircraft, crews and missiles are immediately available on either side. Any exact mathematical score would therefore imply a level of knowledge that public evidence does not support.

Comparative baseline in 2026

Budget is potential energy

SIPRI estimated a very large gap between Indian and Pakistani military expenditure in 2025.[19] That gap matters for infrastructure, stockpiles, research and a prolonged war. It does not directly predict the result of a one-hour air engagement. Money must pass through procurement, production, acceptance, training and maintenance before it becomes usable combat power.

India's central problem is conversion efficiency: long competitions, changing requirements, engine dependency and multiple agencies can delay the arrival of capability. Pakistan's problem is resource depth: it can prioritise and integrate selectively, but has less margin for mistakes, attrition and expensive inventories. The PAF's 2025 success illustrated conversion efficiency; India's longer-term advantage remains the scale of resources available for correction.

Sortie generation

Sortie generation depends on serviceable aircraft, trained aircrew, weapons preparation, ground equipment, runway availability, fuel and maintenance shifts. A high-end fighter with low availability may contribute less than a simpler aircraft flown repeatedly. Aircraft also require periodic deep maintenance, meaning not every airframe can be surged indefinitely.

Dispersal increases survivability but consumes transport, security, communications and technical manpower. Hardened shelters protect aircraft yet can become predictable targets. Rapid runway repair matters only if taxiways, fuel and weapons areas also survive. The effective air base is therefore a system of people and infrastructure rather than a runway with aircraft parked beside it.

Missile and spare-part inventories

Air forces rarely publish missile stocks. A few days of high-intensity combat can consume years of peacetime purchases, especially when commanders fire multiple weapons to raise kill probability. Long-range missiles are expensive and production lines may be slow. Surface-to-air systems also require reloads that are harder to move and protect than launchers.

Pakistan's Chinese supply relationship can shorten some resupply paths but increases dependence on one strategic partner. India has a wider supplier portfolio and growing domestic missile production, but mixed foreign inventories complicate replenishment. Local manufacture of seekers, propulsion, electronics and warheads is more valuable than simple final assembly.

Human capital and learning rate

Pilot hours are only one measure of training. Complex large-force exercises, electronic-warfare realism, debrief quality, controller proficiency and the ability to rewrite tactics after failure matter more. May 2025 showed Pakistan exploiting a prepared concept and India adapting after losses. The side that institutionalises those lessons rather than protecting reputations will improve faster.

Maintenance engineers, software specialists, intelligence analysts and weapons controllers are equally important. A fifth-generation aircraft can be degraded by poor mission-data preparation or unavailable coatings. Industrial and operational human capital links the factory to the squadron.

Readiness as the conversion of inventory into sorties

Aircraft counts are an incomplete measure of combat power. A fleet generates sorties through serviceable airframes, trained crews, spares, fuel, weapons, ground equipment and functioning runways. High-tempo operations increase component consumption and expose weaknesses that peacetime availability figures may conceal. The force that can repair aircraft overnight and return damaged bases to operation gains cumulative advantage.

Pakistan's compact force can concentrate maintenance expertise but has limited depth if specialised components are disrupted. India has more bases, depots and industrial capacity, yet its diverse fleets require multiple supply chains. Both sides must plan for imported components becoming delayed during a crisis.

Missile production, engines and repair capacity

Modern air campaigns can expend precision weapons faster than they are produced. Stockpile planning must include training use, shelf life and the probability of multiple crises. Indigenous missile production gives India potential depth, while Pakistan's Chinese relationship may provide rapid access but also creates dependence on external strategic decisions. Local assembly and integration reduce risk but do not eliminate dependence on seekers, motors or specialised electronics.

Engines are a particularly difficult dependency. They require advanced metallurgy, manufacturing precision and long testing programmes. Neither state can assume rapid self-sufficiency. A practical strategy is to secure multiple support arrangements, maintain reserves and design upgrade paths that do not require complete replacement of the powerplant.

Training, human capital and institutional learning

Pilot quality is not a fixed national characteristic. It is produced through flying hours, realistic exercises, instructor standards, debriefing and a culture that reports errors honestly. AEW&C operators, controllers, electronic-warfare specialists and maintenance personnel are equally important. A technically advanced force can be undermined by centralised fear of failure or by exercises that reward scripted success.

Pakistan's historical emphasis on concentrated training is an advantage, but economic pressure can reduce flying and spares. India's larger training system can produce more crews, but maintaining consistent standards across many fleets is difficult. The ability to learn from 2019 and 2025 without turning lessons into propaganda will be a decisive institutional measure.

Structural comparison

Dimension	Pakistan	India
Strategic optimisation	Focused principally on India; selective high-end concentration	Must balance Pakistan, China and maritime requirements
Industrial strength	JF-17 assembly/integration, maintenance, missiles and growing drone ecosystem	Much larger aerospace, missile, software and private-sector base
Main dependency	China for many high-end sensors, engines and weapons; U.S. support for F-16	Foreign engines, mixed fleet supply chains and imported high-end subsystems
Short-war advantage	Coherent preparation and local decision speed can create disproportionate effect	More strike axes, bases and stand-off weapon options
Long-war advantage	Limited by economy, inventory and attrition sensitivity	Scale, redundancy, geography and larger production potential

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CHAPTER 14

The Air-Power Balance, 2031-2036

Stealth, counter-stealth, collaborative aircraft, very-long-range missiles and resilient combat clouds.

CHAPTER ARGUMENT

By 2036, neither side is likely to replace its full fighter inventory with stealth aircraft. Pakistan may field an imported J-35 unit if negotiations become a contract. India may have AMCA prototypes or an early operational element. Both forces will continue to rely on large numbers of non-stealth fighters. The central task will be integrating the small stealth fleet with the larger conventional force.

KEY THEMES stealth | CCA | counter-stealth

PFX concept art; it does not represent an official design or specification.

Technologies most likely to matter by 2036

Collaborative combat aircraft will extend sensing and weapons capacity while allowing manned fighters to remain farther from danger. The most useful designs may not be exquisite stealth drones; they may be affordable sensor carriers, jammers, decoys and missile trucks that can be produced in numbers.

Passive and multistatic sensing will become more important against low-observable aircraft. Networks may combine VHF/UHF early warning, passive electronic support, infrared search and track, civilian emitters, space-based cues and active fire-control sensors. Detection is not the same as a weapons-quality track, but multiple weak observations can narrow uncertainty.

Long-range air-to-air missiles will increasingly target the system behind the fighters: AEW&C, tankers, jammers and command aircraft. This creates a contest between missile reach and support-asset standoff distance, and raises the value of unmanned relay nodes and distributed command.

Cyber resilience, zero-trust identity, cryptographic agility, alternate timing sources and rapid software patching will become combat attributes. A force that cannot trust its own data may possess advanced aircraft yet operate as disconnected formations.

The 2031-2036 period is more uncertain because programmes can be transformed by funding, accidents, export controls, engine problems and changes in government. India's official AMCA execution model aims to develop prototypes through industry partnership, with public statements targeting a first flight near the end of the 2020s and development completion in the mid-2030s. These are objectives, not guaranteed service dates. A prototype flight is only the beginning of weapons, sensor, low-observable and reliability testing.

AMCA's strategic value lies in creating an Indian fifth-generation design authority and production ecosystem. Its risks include engine dependence, low-observable manufacturing quality, software complexity and the challenge of moving from prototypes to squadron-scale production. Private-sector competition may improve capacity and accountability, but HAL and established public institutions will remain important because fighter development requires decades of specialised infrastructure.

Pakistan's PFX aspiration is more likely to evolve incrementally. A 4.5-plus-generation platform or technology demonstrator could appear before a fully indigenous fifth-generation fighter. Chinese and Turkish cooperation may accelerate structures, avionics and software. An indigenous engine by the mid-2030s would be an exceptional achievement and should not be assumed without evidence of sustained test facilities, materials research and demonstrator programmes.

Manned-unmanned teaming is more likely to mature than entirely new fighters. Crewed aircraft may control or coordinate reconnaissance drones, decoys, jammers and weapon carriers. The purpose is not to replace pilots immediately but to distribute risk and sensing. A stealth aircraft could remain passive while unmanned nodes move forward, reveal emitters or carry additional missiles.

The missile race will continue. Longer-range weapons may target support aircraft and force AEW&C and tankers farther from the border. Improved seekers and networked mid-course guidance may permit cooperative engagements in which one platform launches and another supplies the terminal-quality track. Defensive electronic warfare, towed decoys and hard-kill anti-missile systems will become increasingly important.

By 2036, the balance may consist of a Pakistani force with some Chinese-origin stealth aircraft, advanced JF-17 and J-10 variants, and growing unmanned integration against an Indian force with a larger Rafale and Tejas fleet, heavily upgraded Su-30s and AMCA in testing or early service. The exact dates matter less than industrial tempo: whichever side can produce, repair, update software and train crews faster will gain the durable advantage.

Between 2031 and 2036, the force balance will be shaped by whether today's programmes cross the difficult boundary from development to operational scale. India aims to fly AMCA prototypes before the end of the decade and move toward production in the mid-2030s. These are targets rather than guarantees. Pakistan may field a J-35 unit earlier if the Chinese offer becomes a contract, while PFX is more likely to remain an evolving technology and prototype programme than a large indigenous fifth-generation fleet by 2036.

Unmanned teaming may mature faster than new manned fighters. Both sides can add reconnaissance, decoy, electronic-attack and strike drones without waiting for a complete next-generation aircraft. The challenge is autonomous coordination under jamming and the legal and command rules for lethal action. Human crews are likely to retain authority over high-consequence engagements, while machines handle navigation, sensor management and distribution of tasks.

The BVR race will continue beyond PL-15 and Meteor. Internal carriage will favour compact missiles with folded or shortened control surfaces, while multi-mode seekers will combine radar and passive techniques. Very-long-range missiles will attempt to push AEW&C and tankers farther from the front. Countermeasures will include distributed sensors, unmanned relays, passive detection and deceptive emissions. By 2036, the decisive platform may not be the fighter with the longest brochure range, but the network that remains functional after its primary sensors are attacked.

Stealth fleets will remain small and precious

By 2036, neither side is likely to replace its full fighter inventory with stealth aircraft. Pakistan may field an imported J-35 unit if negotiations become a contract. India may have AMCA prototypes or an early operational element. Both forces will continue to rely on large numbers of non-stealth fighters. The central task will be integrating the small stealth fleet with the larger conventional force.

A stealth aircraft can act as a forward sensor, identify emitters, launch internally carried weapons or pass targeting data to missile trucks farther back. This preserves its magazine and reduces exposure. The same concept allows non-stealth fighters to contribute without switching on their own radars.

Counter-stealth networks

Passive RF sensors can detect emissions but may struggle against an aircraft that remains silent. Infrared search and track can detect heat but is affected by weather, aspect and background. Low-frequency radar can provide cueing but usually lacks the precision for a final engagement. Multistatic arrangements place transmitters and receivers at different locations to exploit geometry.

The practical answer is sensor fusion. Several imperfect observations can narrow a search volume until a fire-control sensor or infrared system creates a weapons-quality track. Data latency and geolocation error will determine whether the network merely knows a stealth aircraft is present or can actually engage it.

Collaborative combat aircraft

The most achievable collaborative aircraft will specialise. One may carry a jammer, another extra missiles, another passive sensors and another serve as a decoy. A modular design allows production in larger numbers and

rapid software change. The force must decide how much autonomy is acceptable when communications are jammed.

Pakistan can exploit Chinese scale and Turkish experience, while India can draw on a larger domestic software, aerospace and private-sector base. The winner will not be the side with the earliest concept art. It will be the side that repeatedly flies reliable prototypes, integrates them with command systems and funds serial production.

The next missile race

Very-long-range air-to-air missiles will threaten AEW&C, tankers and stand-off jammers. Their effectiveness depends on finding and updating targets over great distances, where small errors produce large miss distances. Support aircraft will respond by operating farther back, changing orbits, using escorts and transferring functions to unmanned relays.

Compact internal weapons will be important for stealth fighters. Multi-pulse motors, ramjets, improved batteries and smarter seekers may expand no-escape zones. Countermeasures will become cooperative: one aircraft detects the missile, another jams, a decoy transmits false information and the formation changes geometry.

Resilient combat cloud

The phrase combat cloud can conceal a basic engineering reality: the network must work under attack. It needs alternate paths, local processing, cryptographic agility, trusted identity and the ability to operate when disconnected. Edge nodes should continue to fuse nearby data rather than wait for a central server. Software updates must be rapid but authenticated.

The 2036 advantage will belong to the force that can lose important nodes and still create a sufficiently accurate picture. Perfect connectivity is unrealistic; graceful degradation is the real standard.

Stealth and counter-stealth in regional conditions

By the early 2030s, low-observable aircraft may become part of the regional balance. Stealth reduces the range at which conventional fire-control radars can detect and track an aircraft, especially from the front, but performance varies by frequency and aspect. External weapons, open bays, emissions and maintenance condition can increase signature. Counter-stealth approaches combine lower-frequency radars, passive receivers, infrared sensors and multi-static geometry. These may provide warning without always providing a weapons-quality track.

A Pakistani J-35 force could create local uncertainty and pressure Indian high-value assets. An Indian AMCA force could offer similar advantages later, especially when supported by India's larger strike and surveillance architecture. Neither would independently deliver air supremacy. The side that fuses multiple sensors and assigns the correct shooter will gain the more useful advantage.

Collaborative aircraft, automation and decision support

Future aircraft will use greater onboard automation to manage sensors, electronic warfare and unmanned teammates. Decision-support tools can prioritise tracks and recommend weapons, but human commanders remain responsible for identification and escalation. Systems trained or configured on incomplete data may make confident errors, particularly in a cluttered battlespace with deception.

Collaborative aircraft can extend sensor coverage, carry additional missiles or expose air defences without risking a pilot. Their usefulness depends on secure communications and the ability to continue a limited mission when links are interrupted. Pakistan may gain access through Chinese or Turkish collaboration; India may build a broader domestic ecosystem. Operational maturity, not demonstration flights, should guide assessment.

The contested base and the transparent battlespace

Persistent commercial and military surveillance will make large air bases increasingly observable. Aircraft movement, runway repair and support activity can be tracked through satellites and drones. Both sides will need dispersal sites, shelters, decoys and mobile support. The ability to generate sorties from secondary locations may determine survival more than the hardness of one principal base.

At the same time, transparent imagery will intensify information warfare. Damage may be visible but difficult to interpret; repaired facilities can be presented as undamaged, while minor impact can be exaggerated as destruction. Professional battle-damage assessment must combine imagery, signals, operational behaviour and repeated observation.

PROJECTION DISCIPLINE

J-35, AMCA, PFX and collaborative aircraft are assessed by the industrial and training steps required for operational service, not by programme announcements alone.

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CHAPTER 15

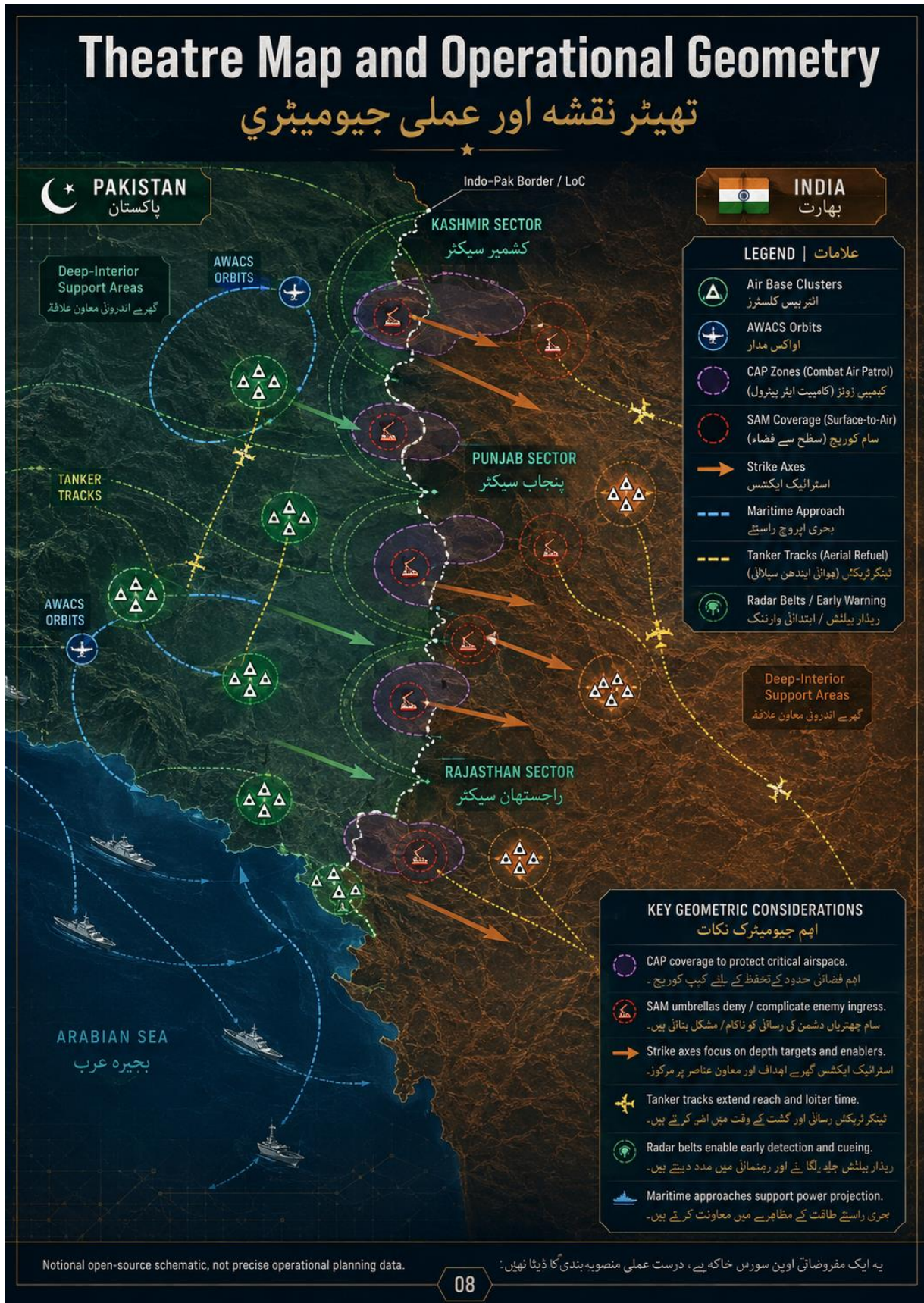
Conflict Scenarios

The first 48 hours, a two-week campaign, prolonged war, maritime expansion and two-front stress.

CHAPTER ARGUMENT

A short crisis rewards intelligence, pre-positioning and political clarity. Pakistan can concentrate its best fighters and airborne warning against a predictable eastern threat, use controlled emissions and attempt to create an early BVR ambush. India can generate more strike axes, use Rafale and Su-30MKI with stand-off weapons, and exploit a larger base network. The first losses would have disproportionate political effect because both governments would immediately frame them as proof of technological and doctrinal superiority.

KEY THEMES duration | escalation | termination



Visual Plate VII. Theatre geometry and support areas. This is a notional educational schematic and not a representation of precise deployments.



Visual Plate VIII. Comparative advantages, vulnerabilities and escalation pressures. The balance changes with scenario and duration.

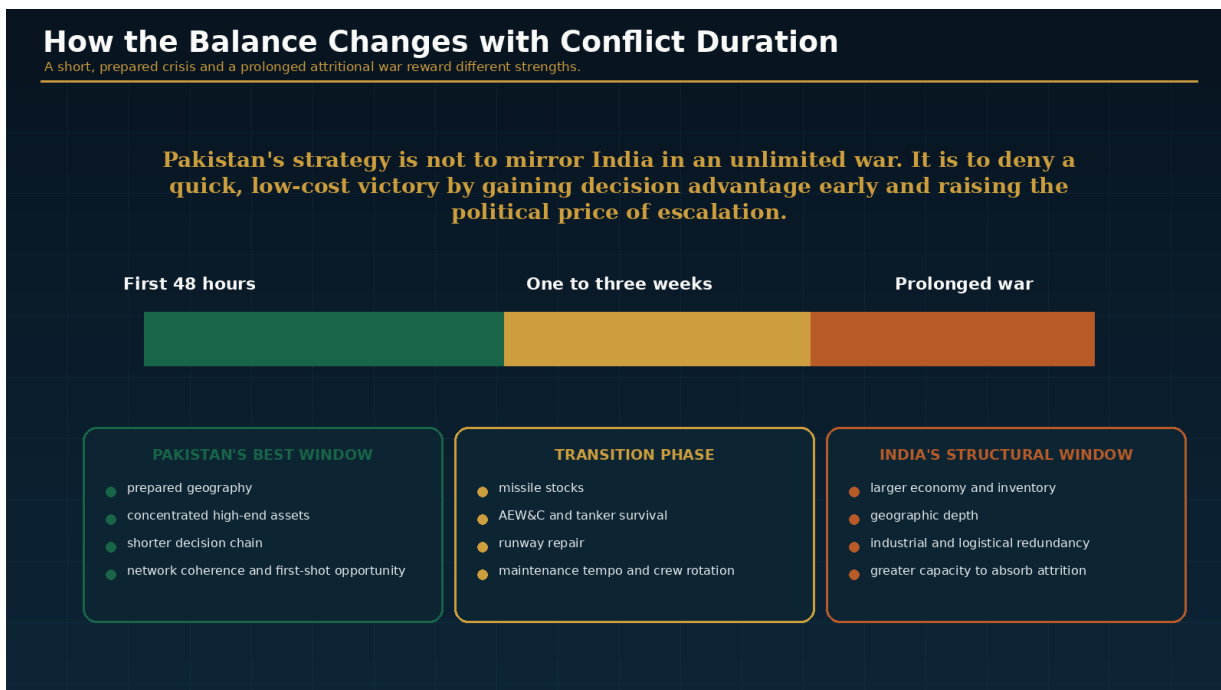


Figure 15.1. Conflict duration changes the balance: Pakistan's prepared network can be most influential early, while India's scale becomes more important as the campaign lengthens.

The balance depends on duration

In the first 48 hours, Pakistan may benefit from a focused threat model, prepared geography, concentrated high-end assets and a shorter decision chain. India may benefit from a larger set of stand-off weapons, more bases and the capacity to open several axes. Surprise and intelligence can outweigh aggregate inventory.

Across one to three weeks, runway repair, missile stocks, AEW&C survival, maintenance shifts, spare engines and the ability to rotate crews become decisive. India's larger force and geography create redundancy; Pakistan's tighter integration can still impose costs if its key nodes survive.

In a prolonged conventional war, India holds the stronger structural position through economic scale, industrial breadth and inventory depth. Pakistan's deterrence strategy is therefore designed to deny easy victory and raise escalation costs early, not to mirror India in an unlimited attritional contest.

Final judgment

India has the larger strategic resource base. Pakistan has demonstrated that operational coherence, tactical preparation and a well-designed sensor-to-shooter chain can offset part of that gap in a limited opening engagement. Neither conclusion cancels the other.

By 2036, the balance will be determined less by whether one side owns a particular headline fighter and more by whether it can integrate sensors, protect enablers, generate sorties, replenish weapons, repair bases and learn faster than its opponent. The most dangerous outcome is not a clear permanent advantage, but mutual confidence that a short technological strike can be controlled.

Conflict scenarios

A limited crisis lasting hours or a few days favours preparation, surprise, intelligence and concentrated high-end capability. Pakistan's focused threat model and shorter internal lines may allow it to assemble a coherent opening defence and impose visible losses. India can still launch large standoff packages and use its greater depth, but it must avoid presenting predictable formations to Pakistani long-range sensors and missiles.

A conflict lasting one to three weeks becomes a contest of runway repair, munitions, airborne-warning survival, electronic warfare and sortie generation. India can rotate a larger number of aircraft and operate from more bases. Pakistan can exploit proximity and a dense defensive network but becomes increasingly sensitive to losses and stockpile depletion. External resupply and diplomatic support would matter for both sides.

A prolonged conventional war favours India structurally. Its economy, industrial base, inventory and geographic depth offer greater potential for replacement and adaptation. Pakistan would seek to prevent the conflict from reaching this stage by imposing early costs, threatening further escalation and mobilising Chinese, Gulf, Turkish and international diplomatic pressure for a ceasefire.

A two-front scenario involving China places severe strain on India but does not mean that Pakistan can assume unlimited Chinese combat support. Beijing may provide intelligence, logistics, diplomatic pressure or accelerated supplies while avoiding direct intervention. India would prioritise the China front but retain enough capacity to conduct punitive strikes against Pakistan. The risk of miscalculation would be extreme.

The maritime dimension could widen the conflict. India's navy is much larger and can pressure Pakistan's trade routes, while Pakistan can use coastal aircraft, submarines, anti-ship missiles and Chinese-linked maritime awareness to impose risk in the northern Arabian Sea. Airpower would support maritime surveillance, fleet defence and attacks on ports or logistics, but such operations would rapidly broaden the political and economic consequences.

None of these scenarios produces a clean, low-cost victory. The nuclear shadow limits the political objectives that either side can pursue. The realistic measure of success is preserving key forces, achieving limited coercive goals and terminating the crisis before conventional operations create pressure for nuclear signalling.

A limited exchange lasting one or two days would reward readiness, intelligence and pre-planned options. Pakistan could concentrate modern aircraft and long-range missiles to deny a clean Indian strike, while India could use Rafale, Su-30, stand-off weapons and air defence to impose costs. Political objectives would likely be narrow: demonstrate punishment, preserve credibility and avoid a ground war. In this scenario, a small number of aircraft losses could have disproportionate political effect.

A campaign lasting one to two weeks would shift attention toward bases, fuel, weapons stocks, runway repair and support aircraft. India would gain from larger inventories and more geographic depth, while Pakistan would seek to preserve its network and create pressure for external mediation. Both sides would use drones and missiles to attack or threaten enabling nodes. Claims of decisive air superiority would be difficult to sustain because mobile air defence, dispersed fighters and political constraints would limit freedom of action.

A prolonged conventional war would increasingly favour India's economic and industrial mass, but it would also create unacceptable escalation risk. Pakistan's nuclear posture is designed partly to prevent India from converting conventional superiority into an existential threat. India has developed concepts for limited conventional action under the nuclear threshold, yet neither side can know precisely where the other's threshold lies. The likely strategic contest is therefore not conquest but the ability to impose cost, control the narrative and terminate the conflict on acceptable terms.

External actors would shape every scenario. China would be concerned with Pakistan's stability and the security of regional projects; the United States, Gulf states and European powers would seek escalation control; Russia and France would face questions about support and weapons reputation. Diplomatic access, financial support and spare-parts arrangements could affect military endurance. Nevertheless, outside support should not be treated as automatic participation. States assist according to their own interests and may pressure their partners to stop fighting.

Scenario One: the first 48 hours

A short crisis rewards intelligence, pre-positioning and political clarity. Pakistan can concentrate its best fighters and airborne warning against a predictable eastern threat, use controlled emissions and attempt to create an early BVR ambush. India can generate more strike axes, use Rafale and Su-30MKI with stand-off weapons, and exploit a larger base network. The first losses would have disproportionate political effect because both governments would immediately frame them as proof of technological and doctrinal superiority.

Pakistan's best outcome is denial: prevent a clean Indian punitive strike, impose visible cost and retain the ability to respond while leaving a path to ceasefire. India's best outcome is demonstrable damage with limited exposure and no major aircraft loss. The side whose intelligence assumptions are wrong may be punished before aggregate strength becomes relevant.

Scenario Two: a one-to-three-week campaign

The contest shifts from surprise to regeneration. Air bases, fuel storage, communications, weapons stocks, AEW&C orbits and maintenance capacity become primary targets. India can rotate more aircraft and operate from greater depth. Pakistan can use shorter internal lines and a dense defensive network, but every high-value loss is proportionally more serious.

Drones and stand-off weapons would search for radars, support aircraft and repair activity. Both sides would disperse aircraft, move launchers and employ decoys. Claims of air superiority would likely exceed reality because neither side could safely occupy the other's airspace continuously. Diplomatic pressure for termination would grow as strikes approached command, strategic air-defence and nuclear-related infrastructure.

Scenario Three: prolonged conventional war

India's economic, geographic and industrial advantages grow with time. It has more aircraft, larger naval power, a broader supplier base and greater potential to absorb infrastructure damage. Pakistan would seek to prevent this phase by imposing early costs, signalling escalation risk and mobilising diplomatic support. Its military objective would not be attritional parity; it would be denial of a decisive Indian victory.

A prolonged war would also expose India's challenges: replacement engines, mixed fleets, long borders and the possibility of Chinese pressure. Pakistan could receive accelerated Chinese supplies, but direct Chinese participation should not be assumed. Every external actor would balance support with fear of escalation.

Maritime and two-front expansion

India's navy can threaten Pakistan's trade and maritime logistics, while Pakistan can impose risk through submarines, coastal missiles, maritime patrol and fighter-supported anti-ship missions. Air bases near the Arabian Sea become more important, as do tanker support and maritime surveillance. Attacks on ports or commercial traffic would internationalise the conflict rapidly.

A simultaneous China crisis would divide Indian attention and support assets. It would not eliminate India's ability to strike Pakistan. Pakistan might gain intelligence and supply advantages, but Beijing would make decisions according to its own interests. Two-front planning raises the value of Indian mass; it also increases the danger that a local action is misread as part of a wider coordinated war.

Escalation and termination

Nuclear weapons do not prevent conventional action, but they limit political objectives and compress time for decision. Strikes on air bases can be misread because some facilities may support conventional and strategic forces. Cyber interference with warning systems is particularly dangerous because the victim cannot easily know whether an error is accidental or preparatory.

The safest military success is therefore one that creates a credible off-ramp. Pakistan's 2019 response combined retaliation with the return of the captured pilot. The May 2025 ceasefire followed intense external diplomacy and direct military contact.^{[5][22]} Future planners must treat termination as part of the operation, not as a diplomatic task that begins after combat.

Scenario one: a limited punitive exchange

A future crisis may begin with a stand-off strike against a small set of targets, followed by a Pakistani attempt to restore deterrence without widening the war. In the first 24 to 72 hours, readiness and pre-planned networks would favour the side that mobilised first. Pakistan could create dangerous local air-defence and BVR conditions, while India could exploit more strike axes and a wider inventory of stand-off weapons.

The central risk is misreading limited objectives. A strike intended as political signalling may destroy a high-value asset or cause unexpected casualties. The opponent may then expand the target set, making each side's original restraint irrelevant. Reliable communication and clearly bounded objectives become operational capabilities in their own right.

Scenario two: a sustained air and missile campaign

In a campaign lasting weeks, the balance shifts toward inventory, repair and industrial depth. India can draw on more bases and a larger economy, but must protect long supply lines and manage a mixed fleet. Pakistan can exploit geographic concentration and coherent command, but becomes increasingly sensitive to attrition of AEW&C aircraft, radars, tankers and specialised munitions.

Neither side is likely to achieve effortless air superiority. Dense air defence and long-range missiles would encourage stand-off attacks, drones and repeated efforts to disrupt the enemy network. The outcome would be measured in sustained sortie generation and political endurance rather than dramatic fighter sweeps.

Scenario three: maritime pressure and a two-front complication

The Arabian Sea provides additional axes for surveillance, missile attack and air operations. India's naval aviation and maritime depth create opportunities to pressure Pakistan's coast and trade routes. Pakistan can respond with land-based aircraft, anti-ship weapons, submarines and coastal surveillance. Airborne warning and refuelling become critical because maritime distances reduce persistence.

A simultaneous India-China crisis would impose a far greater planning burden on India and could constrain the forces available against Pakistan. This does not mean China would automatically enter a conflict on Pakistan's behalf. It means India must retain strategic reserves and cannot evaluate the western front in isolation. Pakistan, meanwhile, must avoid assuming that diplomatic alignment guarantees operational intervention.

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CHAPTER 16

Final Assessment

Pakistan's operational coherence, India's structural depth and the limits of technological victory.

CHAPTER ARGUMENT

Pakistan cannot erase India's scale, but it has repeatedly shown an ability to convert limited resources into concentrated operational effect. Its strongest attributes are a focused threat model, high emphasis on air-defence readiness, selective acquisition of enablers and an increasingly coherent Chinese-Pakistani technology ecosystem. Operation Swift Retort restored deterrence in 2019; the strongest available evidence indicates that the PAF gained the opening air-combat advantage in May 2025.

KEY THEMES coherence | depth | conditional balance

India holds the larger structural advantage. It has a much bigger economy, military budget, industrial base, aircraft inventory, geographic depth and capacity to sustain a prolonged campaign. It can pursue several fighter programmes and foreign partnerships simultaneously. If its procurement and production systems improve, this advantage will grow through the 2030s.

Pakistan holds important operational and institutional advantages that make aggregate comparisons misleading. It plans primarily for one adversary, has developed a culture of concentrated air defence and seeks to integrate affordable fighters with airborne warning, long-range missiles, ground sensors, drones and electronic warfare. It can create local decision advantage and impose costs disproportionate to its budget.

In the opening phase of a future conflict, neither side should assume superiority. Pakistan may have the stronger opportunity for surprise and denial, particularly if it adds stealth and larger AEW&C nodes. India may have the stronger capacity for deep standoff retaliation and rapid tactical adaptation. The first side to lose confidence in its common operating picture will be placed under severe pressure even if it retains many aircraft.

Over time, India's mass and repair potential become more important. Pakistan's external relationships with China, Saudi Arabia, Turkey and other partners can provide financing, logistics, diplomacy and technology, but they do not erase the vulnerability of a smaller economy. India's partnerships with France, the United States, Israel and Russia similarly provide options but create integration and political dependencies.

The decisive competition from 2026 to 2036 will not be Rafale versus J-10, J-35 versus AMCA or Meteor versus PL-15 in isolation. It will be between two military systems: their ability to observe accurately, decide under pressure, distribute information, protect high-value assets, generate sorties, repair damage, replenish weapons and control escalation. The strongest system will be the one that remains coherent after its initial assumptions fail.

The final judgement is therefore conditional. Pakistan is capable of denying India a cheap victory and may hold an advantage in a carefully prepared short air contest. India is better positioned for a prolonged conventional struggle and has the greater long-term ceiling. Deterrence remains stable only when both sides recognise these truths and resist turning tactical success into the belief that escalation can be controlled indefinitely.

Pakistan's principal advantages are concentration, a focused threat model, experience with selective modernisation and the possibility of rapid access to Chinese systems. Its networked approach can create favourable opening conditions and make Indian air operations costly. Its principal vulnerabilities are smaller force depth, economic pressure, dependence on external supply and the exposure of key bases and infrastructure within a narrow geography.

India's principal advantages are scale, budget, industrial breadth, geographic depth and a larger set of combat and support platforms. These create greater capacity for sustained operations and adaptation. Its principal vulnerabilities are slow procurement, declining legacy squadrons, a complex multi-origin fleet and the challenge

of producing a unified operational picture across services and systems. India's size is potential power; integration and availability turn it into usable power.

No responsible open-source study can declare a certain winner for a future war. In a short, controlled crisis, Pakistan may be able to deny India's objectives or achieve a favourable tactical result. In a longer conventional campaign, India's structural advantages become progressively stronger. In every case, nuclear risk and international intervention limit the meaning of victory. The most durable conclusion is that neither side can assume a cheap air campaign, and both have strong incentives to invest in resilient command, training, passive defence and crisis communication.

The decade to 2036 will not be decided by one aircraft purchase. J-35, Rafale, AMCA or PFX can alter specific missions, but the balance will emerge from production rates, missile inventories, airborne warning coverage, data quality, electronic warfare, repair capacity and the judgement of commanders. The rivalry has moved from platform competition to system competition. The force that learns faster and converts resources into reliable operational networks will hold the more meaningful advantage.

Pakistan's enduring advantage: coherence under constraint

Pakistan cannot erase India's scale, but it has repeatedly shown an ability to convert limited resources into concentrated operational effect. Its strongest attributes are a focused threat model, high emphasis on air-defence readiness, selective acquisition of enablers and an increasingly coherent Chinese-Pakistani technology ecosystem. Operation Swift Retort restored deterrence in 2019; the strongest available evidence indicates that the PAF gained the opening air-combat advantage in May 2025.

This advantage is conditional. It depends on AEW&C survival, secure links, missile stocks, serviceability and the ability to protect a small number of high-value aircraft. Economic pressure or supplier disruption can reduce it quickly. Pakistan's future strength will come from deepening the system - production, software, sensors, shelters, training and unmanned mass - rather than treating one stealth fighter as a complete solution.

India's enduring advantage: depth and a higher ceiling

India has the greater long-term ceiling. Its economy, industrial base, inventory, geography and international partnerships provide more options and greater capacity for a prolonged campaign. Rafale expansion, Tejas production, Su-30MKI upgrades, indigenous missiles and AMCA could create a substantially stronger force by the mid-2030s.

The risk is execution. A larger budget cannot compensate indefinitely for slow procurement, fragmented command or low availability. The May 2025 opening losses demonstrated that premium aircraft cannot overcome wrong intelligence and an inferior local picture. India's later adaptation demonstrated that a large institution can learn under fire. The future balance depends on whether that learning becomes permanent integration.

The conditional balance

In a short, carefully prepared air contest, Pakistan may hold a local decision advantage and can deny India a cheap punitive operation. In a longer campaign, India's redundancy and industrial depth become progressively more important. In a prolonged war, India holds the stronger conventional position, but the nuclear shadow makes converting that advantage into decisive political victory extraordinarily dangerous.

The rivalry is therefore stable only when both sides understand the limits of their strengths. Pakistani tactical success must not become confidence that every escalation can be controlled. Indian structural superiority must not become confidence that losses can be absorbed without political consequence.

The decisive questions for 2036

The balance will be determined by five questions. First, can each force maintain a common operating picture after AEW&C, satellites and command nodes are attacked? Second, can it produce and replenish long-range missiles at wartime rates? Third, can its air bases repair damage and generate sorties under persistent drone surveillance? Fourth, can its industrial system update software and mission data faster than the adversary changes tactics? Fifth,

can political leaders define achievable objectives and terminate combat before tactical success creates strategic catastrophe?

Aircraft remain important, but they are components of these questions. The future contest is not simply J-35 versus AMCA, J-10CE versus Rafale or PL-15 versus Meteor. It is the contest between two national systems for sensing, decision, production, learning and escalation control.

A conditional balance, not a permanent ranking

At the 2026 baseline, India holds the larger structural advantage in aircraft numbers, geography, budget and industrial potential. Pakistan possesses a credible local counterweight built around preparation, network integration, modern Chinese weapons and a force designed almost entirely around the Indian problem. These advantages apply at different time scales. Pakistan can be particularly dangerous in the opening phase of a short, prepared crisis; India becomes progressively stronger as duration and breadth increase.

This conclusion rejects two simplistic narratives. India cannot assume that material superiority guarantees a low-cost punitive campaign. Pakistan cannot assume that early tactical success removes India's ability to adapt or sustain pressure. Deterrence is produced by the interaction of these limits.

What should be measured between 2026 and 2036

The most useful indicators are operational rather than promotional: annual fighter and missile deliveries; AEW&C mission availability; pilot and controller training; runway-repair exercises; data-link interoperability; electronic-warfare reprogramming; base dispersal; and the time required to convert a new platform into a combat-ready squadron. Prototype rollouts and procurement announcements should be recorded, but not counted as deployed power.

Pakistan's decisive programmes are JF-17 Block III scale, J-10CE sustainment, support assets, weapons and the conditions attached to any J-35 induction. India's decisive programmes are Tejas production, Su-30MKI modernisation, Rafale expansion, AEW&C growth and the disciplined development of AMCA. Both sides will gain more from resilient networks and stockpiles than from prestige platforms unsupported by the wider system.

The final strategic judgement

Pakistan's 2019 and 2025 performance supports the judgement that its air force can produce operational effects disproportionate to its size. That conclusion is compatible with recognising India's larger long-term ceiling. The future balance will be decided by who learns faster, who protects high-value enablers and who can continue operating after the first carefully prepared plan fails.

The greatest danger is not that one side possesses a perfect weapon. It is that tactical success creates political overconfidence. Long-range precision, stealth, cyber operations and unmanned mass compress decision time while increasing uncertainty about intent and damage. The most professional air-power strategy therefore combines combat readiness with escalation control. Victory in a nuclear-armed rivalry is not simply the destruction of targets; it is the achievement of limited political objectives without opening a path to catastrophe.



Visual Plate IX. Outlook to 2036: the balance will be shaped by integration, readiness, industrial tempo and escalation control.

FINAL JUDGEMENT

Pakistan can deny India a cheap victory and may hold a local opening advantage in a prepared short crisis. India retains the larger long-term conventional and industrial ceiling. Deterrence depends on both sides understanding the limits of those strengths.

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Appendix A - Comparative Technical Tables

A.1 Fighter roles

Platform	Primary strength	Principal constraint	Likely role, 2026-30
JF-17 Block III	Affordable AESA-equipped mass; local assembly and integration	Smaller fuel, payload and sensor aperture	Backbone air defence, escort, strike and maritime missions
J-10CE	High-end PAF BVR platform with strong energy and Chinese weapons integration	Small fleet and external dependence	Priority counter-air, long-range interception and selective strike
F-16 A/B MLU	Mature training ecosystem and proven multirole employment	Age, fleet size and U.S. supply politics	Specialised air defence, precision strike and training benchmark
Rafale EH/DH	Integrated sensors, electronic protection, Meteor and stand-off strike	Limited current numbers; expensive expansion	High-end counter-air, deep precision and nuclear/conventional signalling
Su-30MKI	Range, payload, fleet mass and large upgrade potential	Large signature and maintenance burden	Heavy air superiority, maritime strike and missile carrier
Tejas Mk1/Mk1A	Indigenous production path, modern radar/EW potential	Delivery tempo, engine supply and growth margin	Replacement mass, point defence and multirole squadron regeneration

A.2 AEW&C concepts

Feature	KJ-500 concept	Saab 2000 Erieye
Airframe class	Larger Y-9 transport-derived platform	Compact high-speed turboprop
Radar geometry	Fixed dorsal radome with multiple phased-array faces; full-circle concept	Side-looking Erieye AESA with strongest broadside sectors
Mission volume	Greater potential crew, power, cooling and communications capacity	Smaller crew footprint and mature tactical workflow
Best use	Theatre-level battle management and high-volume networking	Dispersed tactical control, routine surveillance and efficient persistence
Pakistan status	Reported Chinese offer; induction not publicly confirmed as of August 2026	Operational and well integrated in PAF service

A.3 Missile families

Weapon family	Publicly supportable description	Key operational issue
PL-15 / PL-15E	Long-range active-radar BVR family; exact Pakistani variant and maximum range remain unconfirmed	2025 engagement showed Indian range assumptions were inadequate; geometry and offboard updates mattered
Meteor	Network-enabled ramjet-powered BVR missile; manufacturer emphasises a large no-escape zone	Requires high-quality tracks and effective launch geometry; official maximum range not published
Astra Mk1 / Mk2	Indian indigenous BVR family, with Mk2 intended to extend reach	Production scale and full integration across IAF fleets determine effect
AIM-120 family	Mature active-radar missile used by Pakistani F-16s	Variant, inventory age and resupply constraints affect future weight
PL-10 / ASRAAM / R-73 class	High-agility short-range weapons paired with helmet-mounted sights	Merge awareness, off-boresight cueing and countermeasures matter more than nominal range

A.4 Air-defence layers

Layer	Pakistan examples	India examples	Operational purpose
Long range	HQ-9/P family	S-400	Shape airspace, threaten high-value aircraft and defend strategic areas
Medium range	HQ-16/LY-80 family and other systems	MRSAM/Barak-8, Akash variants, SPYDER elements	Area and base defence; fill gaps below the long-range layer
Point defence	Short-range SAMs, guns and counter-drone systems	Short-range SAMs, guns, SPYDER and counter-drone systems	Protect radars, launchers, bases and command nodes
Passive / supporting	Mobile radars, passive receivers, decoys and EW	Mountain radars, passive sensors, decoys and EW	Preserve the network, classify raids and complicate SEAD

Appendix B - Evidence and Procurement Vocabulary



Figure B.1. Evidence categories used in the book.

ESTABLISHED

Supported by multiple independent sources, official records, imagery or physical evidence.

STRONGLY SUPPORTED

Credible converging reporting exists, although some operational detail remains unavailable.

CONTESTED CLAIM

Asserted by one or both parties; evidence is incomplete, disputed or politically shaped.

REPORTED / PLANNED

An offer, approval, negotiation, test or programme objective - not yet an operational capability.

ANALYTICAL PROJECTION

A scenario-based judgement about 2026-2036, not an official plan or prediction.

Procurement status vocabulary

Approval: Political or administrative permission to proceed; not a signed contract.

Contracted: A binding purchase agreement exists, but delivery and operational conversion may take years.

Delivered: Aircraft or systems have physically transferred; they may still be undergoing acceptance or training.

Operational: A unit has trained people, weapons, support and procedures for assigned missions.

Offered: A supplier has proposed a sale; customer acceptance, finance and configuration are not established.

Prototype: A development aircraft or system used for testing; not equivalent to series production.

Appendix C - Glossary

AEW&C - Airborne Early Warning and Control: airborne radar, communications and battle-management capability.

AESA - Active Electronically Scanned Array: radar with many electronically steered transmit/receive modules.

BVR - Beyond Visual Range: engagement beyond direct visual identification, using sensors, networks and guided weapons.

C2 - Command and control: the people, procedures and systems used to direct forces.

CCA - Collaborative Combat Aircraft: unmanned aircraft designed to team with crewed platforms.

DEAD - Destruction of Enemy Air Defences: physical removal of radars, launchers and command elements.

EMSO - Electromagnetic Spectrum Operations: coordinated sensing, protection, attack and management of the spectrum.

IADS - Integrated Air Defence System: network of sensors, command nodes and weapons.

IRST - Infrared Search and Track: passive detection and tracking using heat signatures.

Kill chain - The sequence from detection and identification to decision, engagement and assessment.

LO - Low observability: design and operational measures that reduce detection and tracking.

MUM-T - Manned-Unmanned Teaming: coordinated operation of crewed and uncrewed systems.

NEZ - No-Escape Zone: a geometry-dependent region in which a target is unlikely to defeat a missile kinematically.

RCS - Radar Cross-Section: a measure of how strongly an object reflects radar energy in a given aspect and frequency.

SEAD - Suppression of Enemy Air Defences: temporary disruption or neutralisation of air-defence activity.

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PAF vs IAF: From Balakot to 2036

Written by Muhammad Sohail Ashraf

An educational, well-researched analysis based on open-source information and claims reported worldwide.