STRATEGIC BOMBERS: KEY TO AUGMENT REACH AND LETHALITY OF LAND-BASED AIR POWER

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India's economic progress, political stability, diplomacy and depth have put the country at the centre-stage in world affairs. The Indian Air Force is the fourth largest aviation force globally. We form a very potent force that can chart the future of this nation in the next 25 years.

– Air Chief Marshal VR Chaudhari, Chief of the Air Staff, Indian Air Force[1]

INDIA'S ASPIRATIONS AND SECURITY CONCERNS

Being the fifth largest economy in the world, India is at the heart of the prevailing global churn. To achieve the status of a developed nation by 2050 and attain economic prosperity are two predominant aspirations of India's leadership.[2] While emphasising the *Vasudhaiva Kutumbakam* policy at the

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1. Air Chief Marshal VR Chaudhari, Chief of the Air Staff, Republic Summit, New Delhi, April 25, 2023, available at https://www.republicworld.com/republic-summit/republic-summit-2023/air-chief-marshal-vivek-ram-chaudhari-discusses-iafs-trajectory-future-wars-top-quotes-articleshow.html. Accessed on January 2, 2024.
2. *The Times of India*, November 19, 2022, available at https://timesofindia.indiatimes.com/business/india-business/india-to-be-worlds-2nd-largest-economy-by-2050-to-add-a-trillion-

While Pakistan remains a crucial threat in the regional security dynamics, the key events of the recent past have forced India to reorientate its security outlook towards its northern neighbour, China.

world forum, India has also conveyed its intentions of taking on a larger role of contributing to the security of its partner states.[3] However, while it is aspiring to elevate its stature in the emerging global power play, India continues to face certain perennial security challenges. If left unaddressed, these challenges may act as impediments to India's aspirations at the regional as well as global stage. In the west, the unresolved territorial borders with Pakistan strain much of India's economic and military potential. Although Pakistan is presently facing a setback in its economic and political situations, its animosity with India is far from over. While Pakistan remains a crucial threat in the regional security dynamics, the key events of the recent past have forced India to reorientate its security outlook towards its northern neighbour, China.

China perceives India to be a challenger as far as boundary disputes on the Line of Actual Control (LAC) are concerned.[4] The British-demarcated 'Macmohan Line' has not been accepted by China as the border between the two countries and China continues to occupy Aksai Chin as well as Shaksgam Valley (ceded by Pakistan). Further, in the northeast, China lays claim to the entire state of Arunachal Pradesh and refers to it as 'South Tibet'. The clashes of 2017 at Doklam and 2020 at Galwan have highlighted the nature of hostilities between the two countries.[5] Since the 2020 Galwan crisis, amidst a prolonged stand-off across the LAC, China continues to

dollar-to-gdp-every-12-18-months-gautam-adani/articleshow/95621973.cms. Accessed on January 3, 2024.

3. Harsh V. Pant, Observer Research Foundation, April 6, 2023, available at https://www.orfonline.org/research/indias-role-in-the-world-order-is-keenly-being-watched/. Accessed on January 5, 2024.
4. Sibaram Badatya, available at https://ccas.uok.edu.in/Files/93269b6c-7f53-4439-ae9a-3bdf55a4c649/Journal/c3864aea-e802-426e-bba2-e5f7360199c2.pdf. Accessed on February 20, 2024.
5. Available at https://www.crisisgroup.org/sites/default/files/2023-11/334-thin-ice-himalayas.pdf. Accessed on February 21, 2024.

expand its military at an unprecedented scale. While every arm and service of the People's Liberation Army (PLA) is being developed at a rapid pace to transform it into a world class military, the emphasis placed on modernisation of the People's Liberation Army Air Force (PLAAF) is unmatched.

Having witnessed past and recent campaigns such as the Gulf War, Kosovo War and ongoing Russia-Ukraine War, China has understood very well that the air domain will be a definitive game-changer in any future military conflict.

The asymmetric advantage in capabilities that the Indian Air Force (IAF) enjoyed so far is rapidly shrinking. Therefore, considering the PLA's swift transformation and to be ready for a future military confrontation with China, enhancement in capability as well as the capacity of India's land-based air power remains a strategic necessity.

In the India-China context, the Doklam crisis of 2017 can probably be considered as the turning point where the People's Liberation Army (PLA) came to understand its challenges in undertaking an air campaign from the Tibetan plateau.[6] Since then, the pace at which the PLAAF has developed its infrastructure and modernised its assets is unparalleled. From expanding its airfield network to add 4th and 5th generation aerial platforms in its inventory, the PLAAF is rapidly plugging its vulnerabilities and filling the existing voids. The asymmetric advantage in capabilities that the Indian Air Force (IAF) enjoyed so far is rapidly shrinking. Therefore, considering the PLA's swift transformation and to be ready for a future military confrontation with China, enhancement in capability as well as the capacity of India's land-based air power remains a strategic necessity.

The core argument of this article states that the emerging threat environment in India's security dynamics necessitates a ***persistent growth in the reach and offensive lethality of its land-based air power***, towards which, ***acquisition of strategic bombers*** is a viable and a long-term solution.

6. Air Marshal KK Nohwar, available at https://capsindia.org/wp-content/uploads/2021/10/CAPS_ExpertView_KKN_01.pdf. Accessed on February 21, 2024.

To deliberate on this argument, let us first understand the emerging threat environment in India's continental and maritime security construct.

THREAT ASSESSMENT: CONTINENTAL SECURITY CONSTRUCT

Airfield infrastructure is one of the most important cogs in the wheel when it comes to application of air power throughout the spectrum of war. The quantum and quality of air power that can be generated would largely depend on the scale of the infrastructure it has. There has been ample evidence throughout the history of air campaigns that the addressing enemy's air power at its point of origin through targeting of its airfield infrastructure will remain a priority towards achieving control of the air.[7] As far as airfield infrastructure in the Tibet Autonomous Region (TAR) is concerned, seven of the PLAAF's airfields are located closer to the LAC. Out of these seven, four are situated in high altitude regions. Operations from the high altitude airfields would impose considerable load carrying penalties in terms of both airlift and weapon carriage capabilities. The rugged terrain and hostile climate conditions are likely to further restrain the tempo of operations. Being closer to the LAC, these airfields also remain vulnerable to the enemy's actions.

To mitigate these limitations, therefore, China has no alternative but to develop and exploit its depth airfields. China is planning to further upgrade the existing infrastructure and construct 59 additional general aviation airports across the entire TAR by 2035, a majority of which lie in depth.[8] Rapid transformation of airfield infrastructure in the TAR post the Galwan crisis is testimony to this fact. The only limitation of the depth airfields is their greater distance from the LAC. Towards this, China is undertaking rapid upgradation of its aerial platforms such as the H-6 bombers, Flight Refuelling Aircraft (FRA) and 4th as well as 5th generation fighter aircraft. For example,

7. Ravinder Chattwal, *Air Power Journal*, vol. 8, no. 4, Winter 2013 (October-December), pp. 74-76.
8. *Nepal Minute*, February 15, 2023, available at https://www.nepalminute.com/detail/1806/china-to-develop-5000km-railway-lines-and-59-airports-in-tibet-2023-Feb-15-443700. Accessed on February 27, 2024.

the H-6 bombers can fly for an approximate combat range of 3,000 km and launch state-of-the-art cruise missiles such as the KD-20 with ranges more than 2,000 km, thereby ensuring a total strike distance of 5,000 km.[9] A large fraction of the PLAAF fighter aircraft fleet comprises 5th and 4.5 generation aircraft such as the J-20, J-16, J-11B and J-10C. These aircraft are known to have much greater ranges and endurance than their predecessors such as the J-8 and JH-7A and, therefore, will be able to undertake sustained operations from the depth airfields as well.

Further, swift insertion of the People's Liberation Army Ground Force (PLAGF) in crucial battle zones is expected to be facilitated through a rapidly proliferating transportation network across Tibet.[10] A considerable number of crucial choke points in this network, including rail/road links and vital bridges are situated in depth. To make matters worse, the entire Tibetan front across the LAC is infested with China's state-of-the-art long-range Air Defence (AD) weaponry.[11] These weapons, including the organic AD of China's surface forces, are expected to be deployed in a layered and tiered manner. As far as the strategic air campaign is concerned, the majority of the strategic targets inside China, including economic/industrial infrastructure and command and control centres are located well in depth. To shape the battlefield and relieve pressure from own surface forces, interdiction of the PLA's transportation network in depth will remain a crucial task for the IAF. Similarly, suppression of long-range AD and strategic targeting of targets located deep inside enemy territory will require employment of long-range platforms and stand-off weapons with larger reach, while ensuring a higher weight of attack.

9. Rick Joe, *The Diplomat*, November 18, 2020, available at https://thediplomat.com/2020/11/how-the-descendants-of-a-1950s-Bomber-transformed-chinas-strike-reach/. Accessed on March 1, 2024.
10. Praggya Surana, "China Shaping Tibet for Strategic Leverage", *Manekshaw Paper*, no. 70/2018, pp. 13-18, available at https://www.claws.in/static/MP70_China-Shaping-Tibet-for-Strategic-Leverage.pdf. Accessed on March 6, 2024.
11. *Indian Defence News*, March 29, 2023, available at https://www.indiandefensenews.in/2023/03/china-deploys-upgraded-hq-9b-surface-to.html. Accessed on March 20, 2024.

Owing to their larger distances from the LAC, most of the depth airfields in the TAR will be outside the radius of action of traditional fighter aircraft and stand-off weapons. The limited reach of fighter aircraft will also hinder the conduct of interdiction operations in depth and, therefore, will directly affect the progress of surface operations. The acquisition of long-range Air Launched Cruise Missiles (ALCMs) and hypersonic weapons has provided a reasonable solution to the issue of reach. However, limited weapon carriage capability of fighter aircraft carrying such weapons would affect the weight of the attack and, therefore, constrain overall employability of such weapons. The shorter stand-off distances of air-to-ground weapons will also place launch platform inside the kill-zone of long-range AD weapons of the adversary, compounding the issue further. Further, the limited carriage capability of fighter aircraft would imply that a larger number of assets would be required for undertaking the missions involving stand-off strikes on far-off targets. This will adversely impact the availability of platforms for other essential tasks such as escorting, electronic warfare, reconnaissance and air defence. Therefore, acquisition of the requisite capability to enhance the existing potential of India's land-based air power in terms of reach and offensive lethality is an inevitable task.

Another aspect that needs mention here is that owing to a better sortie generation rate, faster tempo and higher weight of attack, so far, the IAF has enjoyed an edge over its counterpart in terms of generating greater effort towards coordinated operations. However, this advantage may not last long for two reasons. Firstly, rapid proliferation of the air defence capabilities of China will further deter and deny the freedom of the air space to IAF operations. Secondly, and more importantly, with enhanced capabilities in undertaking operations from its depth airfields, the PLAAF will be able to generate a higher quantum of air effort to contest the IAF, as compared to what it can field today. For the IAF, therefore, achieving control of the air in the times to come would be more challenging. As a result, the air effort towards counter-air operations would have to be increased to achieve the desired degree of control of the air. This may

compromise the effort available for undertaking coordinated operations and strategic targeting. If the balance between counter-air and other roles is to be maintained, the reach and offensive lethality of land-based air power will have to be enhanced to offset the gains that the adversary is making.

THREAT ASSESSMENT: MARITIME SECURITY CONSTRUCT

Having scanned the northern frontier, let us now assess the security environment in the maritime domain. Mearsheimer argues that China as a state rising to great power status in East Asia will ensure that no state in Asia can threaten it and, hence, views India as a potential rival in its great power ambition.[12] China sees India's geostrategic dominance in the Indian Ocean Region (IOR) as its own strategic weakness. It is expanding its maritime influence in the region to exert pressure on India. With the development of ports such as Hambantota, Djibouti and Gwadar, China continues to enhance its presence in the region to mitigate its vulnerabilities of logistics sustenance in the IOR.[13] China's Indian Ocean naval strategy is not only about protecting its investments or securing its Sea Lines of Communication (SLOCs), but, more importantly, it is also about projecting power across maritime Asia.

In case of a military confrontation between India and China, the airfields located in the Southern Theatre Command (STC) region of China or from China's island chain such as the Spratly Islands located in the South China Sea may be used by the PLAAF to influence the air operations in the IOR. China has also presumably constructed a naval station and airport closer to the Indian Ocean at Cambodia's Sihanoukville in the Gulf of Thailand, towards aerial domination in the Indian Ocean. The *Washington Post* in June 2022 reported that "China is secretly building a naval facility in Cambodia

12. John J. Mearsheimer, *Foreign Policy*, no. 146, January-February 2005, pp. 47-48.
13. Gopal Suri, "China's Expanding Military Maritime Footprints in the Indian Ocean Region (IOR), India's Response", available at https://www.vifindia.org/sites/default/files/china-s-expanding-military-maritime-footprint-in-the-indian-ocean-region-india-s-response_0.pdf. Accessed on March 28, 2024.

The H-6, with its claimed carrier killer, the YJ-12 anti-ship missile can cover a vast range of 4,000 km into the Pacific Ocean from China's mainland, thereby threatening any potent naval force within the second island chain.

for the exclusive use of its military" on the northern portion of the erstwhile US Ream Naval Base on the Gulf of Thailand.[14] At the Dara Sakor airfield, China has built a 2-mile-long runway, big enough for China's long-range bombers and military transport planes to operate from.[15] Due to the distance and logistical problems for fighter aircraft, the PLAAF might also use bombers for air operations in the IOR. In 2020, China propagated the information regarding using its H-6 bombers for simulating a strike on the United States' Anderson Air Force Base in Guam (located 3,000 km from mainland China).[16] The perceived threat from such platforms carrying anti-ship and land attack cruise missiles apparently forced the USA to first withdraw some of its high value aerial assets from Guam and, thereafter, to undertake a massive overhaul of its island defences. The H-6, with its claimed carrier killer, the YJ-12 anti-ship missile can cover a vast range of 4,000 km into the Pacific Ocean from China's mainland, thereby threatening any potent naval force within the second island chain.[17] While we mention these capabilities in the context of the Pacific Ocean, similar employment of these assets in the IOR (should the need arise) cannot be ruled out.

The People's Liberation Army Navy (PLAN) has also expanded to become the largest naval force in the world, and is expected to have four

14. Ellen Nakashima and Cate Cadell, *The Washington Post*, June 6, 2022, available at https://www.washingtonpost.com/national-security/2022/06/06/cambodia-china-navy-base-ream/. Accessed on October 25, 2024.
15. Hannah Beech, *The New York Times*, December 22, 2019, available at https://www.nytimes.com/2019/12/22/world/asia/cambodia-china-military-bases.html. Accessed on October 26, 2024
16. Gabriel Honrada, *Asia Times*, May 13, 2023, available at https://asiatimes.com/2023/05/us-readying-for-chinese-hypersonic-attack-on-guam/. Accessed on April 1, 2024.
17. US Department of Defence, "Military and Security Developments Involving the People's Republic of China 2023", p. 62, available at https://media.defense.gov/2023/Oct/19/2003323409/-1/-1/1/2023-MILITARY-AND-SECURITY-DEVELOPMENTS-INVOLVING-THE-PEOPLES-REPUBLIC-OF-CHINA.PDF. Accessed on April 20, 2024.

to five aircraft carriers in the near future.[18] China has already announced its intention of having a two-ocean navy in the Pacific and Indian Oceans and, by 2030, the Chinese Navy is expected to reach 425 ships.[19] With the induction of modern surface vessels, sub-surface platforms and aerial assets, the PLAN is expanding at an unprecedented scale. The Chinese Navy's modernisation initiative, which began in the late 1990s, has led to the installation of contemporary weapon systems and the replacement of aging ships with larger, more technologically sophisticated vessels.[20] The potent AD weapons onboard PLAN warships, with ranges of more than 300 km will also pose a strong deterrent to any offensive action against them.[21]

In hostilities, China is likely to, first, re-route its SLOCs to further south (even at the cost of delays) and, second, protect its SLOCs with widespread employment of the PLAN across the IOR.

Many argue that India's precarious position on the LAC can be offset and mitigated by exerting pressure on China in the IOR by threatening its trade. This is easier said than done. In hostilities, China is likely to, first, re-route its SLOCs to further south (even at the cost of delays) and, second, protect its SLOCs with widespread employment of the PLAN across the IOR. The PLAN has also started to deploy Anti-Ship Cruise Missiles (ASCMs) onboard its naval platforms. To be able to undertake short-notice dynamic targeting of PLAN assets at extended ranges away from shores and interdict China's SLOCs in the southern IOR in the diverse maritime zone, while remaining outside the lethal envelope of the PLAN AD, enhancing the reach of land-based air power, in addition to the carrier-based capabilities is a crucial requirement.

18. Congressional Research Service (CRS), "China Naval Modernization: Implications for U.S. Navy Capabilities—Background and Issues for Congress", pp. 23-28, available at https://sgp.fas.org/crs/row/RL33153.pdf. Accessed on March 30, 2024.
19. Congressional Research Service, CRS Report 2022, December 1, 2022, https://sgp.fas.org/crs/row/RL33153.pdf. Accessed on October 31, 2024.
20. Richard Bitzinger, *China Perspective*, vol. 8, no. 4, 2011, pp. 7-15.
21. Franz-Stefan Gady, *The Diplomat*, January 24, 2017, available at https://thediplomat.com/2017/01/china-commissions-new-Carrier-killer-warship/. Accessed on May 28, 2023.

Further, owing to its interior lines of communication, geography offers India with immense opportunities to dominate the entire western, central as well as eastern IOR. During hostilities, by targeting choke points such as the Malacca, Sunda and Lombok Straits, and China's bases in the IOR as well as the South China Sea, India's land-based air power can favourably shape the military operations in the maritime domain. The IAF has recently demonstrated its ability to undertake long range strikes inside the Indian Ocean, in both the eastern and western sectors.[22] However, with the emerging threat dynamics in the maritime domain and rapidly expanding footprint of PLAN, these abilities require continuous enhancement.

A few challenges in terms of the limited reach of fighter aircraft and their limited capability of carriage of stand-off weapons, as highlighted in the continental domain, may affect air operations by the IAF in the maritime domain as well. Apart from these challenges, the extent of application of India's land-based air power into the IOR is constrained due to the limited basing infrastructure in the southern peninsula and island territories. Further, in a multi-front scenario, the number of fighter aircraft that can be exclusively spared for the maritime role will be limited. Even if the assets are pooled in from other commands, employment of the FRA will, in most cases, be a prerequisite to support long range strike missions in the IOR. This aspect is specifically crucial from the point of view of addressing distant choke points. To address the threats any further south in the IOR, irrespective of their basing, the FRA will be an indispensable component of the overall force package.

NEED TO ENHANCE REACH AND OFFENSIVE LETHALITY

The factors mentioned in the threat assessment in the continental as well as maritime security construct emphasise the fact that to meet the operational requirements of the IAF in a future air campaign, enhancement in its reach is an inevitable necessity. In fact, just to be able to reach far-flung battlefields alone will not suffice. The equally important aspect is to deliver the requisite

22. Radhey Tambi, Centre for Air Power Studies, July 24, 2023, available at https://capsindia.org/strengthening-24x7-vigil-in-the-indian-ocean-region/. Accessed on March 26, 2024.

weight of attack and ensure the requisite concentration of firepower while maintaining the desired tempo. The history of military aviation has proved on numerous occasions that reach and offensive lethality, two fundamental and unique characteristics of air power, contributed immensely in the application of military might through the domain of the air, for posturing as well as war-fighting. Congruent to the Principles of War such as concentration of force, offensive action, surprise, economy of effort and flexibility, reach and offensive lethality enabled through the domain of the air are the keystone to any military operation.

One such example is the 1971 India-Pakistan War wherein, based on near real-time intelligence, a short-notice mission to attack deep inside East Pakistan at the Governor's House in Dacca was launched by the IAF on December 14, 1971. The outcome was strategic with the surrender of the Governor of East Pakistan.[23] Similarly, the ability to strike rear airfields in West Pakistan by penetrating over 400 km ensured a reasonable degree of control of the air in the western front as well.[24] By virtue of adequate reach inside enemy territory, the IAF could effectively project its power in terms of assets and ordnance.

Similarly, in a carefully planned and executed mission on June 7, 1981, the Israeli Air Force's F-16 fighter jets destroyed the Osirak reactor in the heart of Iraq, 1,600 km from the launch base.[25] Mid-air refuelling in this mission was impossible as the Israeli aircraft would have to sneak into Jordanian or Saudi air space. The excellent reach and weapon carriage capability of the chosen strike platforms, along with potent escort force, led the mission to be a complete success. In an interview in 2005, US President Bill Clinton summed up the strategic effects as "everybody talks about what the Israelis did at Osirak in 1981, which, I think, in retrospect, was a really good thing. You know, it kept Saddam from developing nuclear power."[26] The ability to project

23. Air Commodore Jasjit Singh (Retd.), *Defence from the Skies* (New Delhi: KW Publishers Pvt Ltd, 2013), pp. 167-168.
24. Ibid., pp. 149-160.
25. John T. Correll, available at https://www.airandspaceforces.com/PDF/MagazineArchive/Documents/2012/April%202012/0412osirak.pdf. Accessed on May 25, 2023.
26. Available at https://en.wikipedia.org/wiki/Operation_Opera. Accessed on May 25, 2023.

Without undermining their potential, however, it must be borne in mind that land-based air power offers certain unique attributes which are difficult to be replaced by any other means in the foreseeable future.

power, deep inside the enemy territory, was largely attributed to the Israeli Air Force's ability of undertaking long range strikes.

On another occasion, while answering the call for assistance from the Malian president to prevent *jihadists* from raiding Bamako and creating a radical Islamist state, French President François Hollande consented to engage his country in the Sahel to fight the *jihadists*. Taking off from Saint-Dizier in eastern France and landing in N'Djamena, the capital of Chad, after hitting 21 targets and spending at least 9 hours and 35 minutes in the air, four Rafales carried out the longest raid in the history of the French Air Force.[27] The shock and awe effect, produced by the rapid and deep striking capability of the French Air Force, served as the backbone of the following campaign which led to the stopping of the *jihadist* offensive and the liberation of occupied Mali. In the ongoing conflicts as well, there are countless examples of the dividends provided by judicious employment of air power, including the recently conducted long range air strikes by Israel on Iran on October 26, 2024.

COUNTERS AND REBUTTALS

Notwithstanding the potential that land-based air power offers, a few options are often viewed as viable alternatives in contemporary warfare. Amongst these, the major ones include surface-to-surface missiles (also referred to as the rocket force) and aircraft carriers. Undoubtedly, these capabilities have a crucial role to play in the changing paradigm of warfare and the future security construct of our nation. Without undermining their potential, however, it must be borne in mind that land-based air power offers certain unique attributes which are difficult to be replaced by any

27. Available at https://www.dassault-aviation.com/en/defense/rafale/combat-proven/. Accessed on May 26, 2023.

other means in the foreseeable future. A comparative analysis shown below aims to substantiate the irreplaceable stature of land-based air power.

Alternative Option	Justification
Surface-to-Surface Missiles (SSMs) • SSMs can address targets in depth. • SSMs would ensure minimum exposure and attrition of manned platforms. • Concentration of firepower can be better ensured by consolidated application of missiles.	**Land-Based Air Power** • Better flexibility to address continental and maritime threats with role changes in minimum time. • Much higher precision and ability to address point targets such as aircraft shelters, bridges and command centres. • Retrievable platforms vis-à-vis SSMs. • Cost-effectiveness and economy of effort. • Limited SSMs and, therefore, cannot be frittered away for a protracted war. • Flexibility to change targeting options mid-flight. • Capability to perform multiple missions in one sortie.
Carrier-Based Air Power • Aircraft carriers can ensure sustained presence of air power elements through mission-based deployments and offshore long duration operations. • By virtue of their ability to reach the southern IOR, carrier-based air power would extend the reach beyond the limit of land-based air power.	**Land-Based Air Power** • Better flexibility to address multi-front continental and maritime threats with role-changes in minimum time. • Easier sustenance due to shore-based logistics and maintenance chain. • Longer reach than carrier-based air power due to the possibility of employing bigger platforms. • Higher load carrying capability. • Swift response in the vast maritime expanse due to the advantage of speed and agility.

WHAT ARE THE OPTIONS?

Having analysed the threat environment, operational vulnerabilities and need of enhancing the reach of land-based air power, let us now deliberate on the solution. First and foremost, the dwindling fighter aircraft strength needs to be arrested with immediate effect, an aspect deliberated upon

more than adequately by now. The estimate of 42 fighter squadrons to tackle a two-front scenario, as generally discussed, needs to be assessed afresh. Factors such as the adversary's defence production rate, emerging geopolitical environment, capacity and capability development wherewithal of the indigenous defence industry and technological evolution need to be factored towards fresh assessments of what we require.

While numerous efforts are being made to fill the voids through strengthening of the local aircraft manufacturing industry, the aspect of reach may be resolved only through the acquisition of long-range long-endurance platforms. Any future procurement of foreign platforms as well as local projects must cater to the need of such platforms. Enhancement of reach, especially in the maritime domain, would also warrant acquisition of more FRA. In the backdrop of ongoing conflicts, the need to acquire long-range stand-off precision weapons also cannot be ignored. Acquisition of air launched cruise missiles, ballistic missiles and hypersonic platforms to counter the complex AD systems of adversaries needs no further deliberation.

STRATEGIC BOMBERS: A VIABLE SOLUTION

The capabilities mentioned hitherto will substantially enhance our capabilities to address threats at far-flung distances. However, the asset which can turn out to be a *game-changer* as far as reach and offensive lethality are concerned, is the '*strategic bomber*'. Subsequent sections of this article will deliberate on the aspects pertaining to bombers and analyse how these can help fill the prevailing voids in our security dynamics.

At the onset of Gulf War-I, on January 16, 1991, seven B-52 strategic bombers armed with ALCMs got airborne from Barksdale Air Force Base in the USA to undertake a 14,000-mile round-trip flight. These, along with the F-117 stealth aircraft and other tactical platforms caused havoc at the Iraqi command and control centres and air defence infrastructure.[28] This ability to penetrate the enemy's defences and deliver a lethal arsenal at such

28. Walter J. Boyne, "50 Years of the B-52", *Air Force Magazine*, December 2001, p. 57, available at https://www.airandspaceforces.com/PDF/MagazineArchive/Documents/2001/December%202001/1201buff.pdf. Accessed on April 27, 2024.

large distances from the home base produced the shock and awe effect. The use of offensive air power crippled the enemy war-fighting infrastructure without any considerable attrition on own side. At the end, a mere 100 hours of ground assault onto Iraq by the allied forces was adequate before the Iraqi land forces succumbed.[29] During the Cold War, both the USA and Soviet Union employed long range strategic bombers as part of their nuclear deterrent strategy. While the Boeing B-52 aircraft were kept in the air round-the-clock at extended ranges from home bases closer to the Soviet borders, Soviet bombers also demonstrated their capability to deliver the arsenal at extended ranges.[30] This assurance of mutual destruction served as a deterrent to both sides and ensured strategic stability in the hostile environment.

It could be the outcome of the role played by bombers in World War II or an intelligent threat appreciation that the IAF always realised the importance of possessing long range bombers. After independence, the Dakota (primarily a load carrier), was converted for the bombing role in the 1947-48 War.[31] The aircraft proved its mettle not only in saving Poonch and Leh but also undertook a few bombing missions against the raiders pouring in across multiple axes. Despite a poor economic situation in the early years after independence, the IAF did not undermine the potential that bombers could offer in meeting the strategic ambitions and security necessities of the nation. Displaying ingenuity and an unambiguous vision, the IAF, along with Hindustan Aeronautics Limited (HAL), successfully recovered and refurbished the wrecked B-24 Liberators which had been abandoned in disused condition by the allied forces after the World War II.[32] These were put to effective use in the subsequent years during operations such as Operation Vijay in 1961.

29. Dr Herman L. Gilster, "Desert Storm: War, Time, And Substitution Revisited", available at https://apps.dtic.mil/sti/tr/pdf/ADA528316.pdf. Accessed on April 30, 2024.
30. Darius E. Watson, "Rethinking the US Nuclear Triad", *Strategic Studies Quarterly*, available at https://www.airuniversity.af.edu/Portals/10/SSQ/documents/Volume-11_Issue-4/Watson.pdf. Accessed on March 30, 2024.
31. Group Captain Kapil Bhargava, *Bharat Rakshak*, November 30, 1999, available at https://www.bharat-rakshak.com/IAF/aircraft/past/b24/. Accessed on April 20, 2024.
32. Ibid.

As the threats evolved, the IAF upgraded its bomber fleet with long range Canberra bomber aircraft. Unfortunately, the decision of not employing air power in offensive roles cost India dearly in the 1962 War.[33] Despite this fact, even in the 1962 War, Canberra aircraft were extensively employed in intelligence and reconnaissance missions across a large battlefront on the LAC. Realising that its decision of not using air power effectively in 1962 was incorrect, the Government of India sanctioned a total of 64 squadrons for the IAF which included three squadrons of tactical bombers and one squadron of heavy bombers.[34] The true potential of the long-range bombers was unveiled in the two India-Pak Wars. From undertaking deep air strikes till as far as Peshawar to causing devastation to Pakistan's economic infrastructure, India's history of air warfare in the 1965 and 1971 Wars is replete with examples of the strategic air operations undertaken by its bomber fleet.[35] The Canberra aircraft was also extensively utilised during the 1999 Kargil War, albeit in a reconnaissance role, before retiring in 2007. Since then, the IAF does not have any strategic or tactical bombers on its strength.

HOW ARE THE BOMBERS UNIQUE?

The bomber aircraft traditionally dominate the tactical fighter aircraft in multiple aspects. Firstly, the bomber aircraft are capable of carrying a much higher armament load. For example, an H-6K bomber can carry a total of six to seven CJ-10 land attack cruise missiles in comparison to extremely limited carriage of such large-sized weapons by a fighter aircraft.[36] Similarly, a Tu-160 class supersonic bomber can carry 40 tonnes of weapon load as compared to only 8-9 tonnes of payload carried by a typical 4.5th generation

33. Air Vice Marshal AK Tiwary, indianstrategiconline.com, issue: vol 21.3, July-September 2006, October 6, 2012, available at https://indianstrategicknowledgeonline.com/web/No Use of Combat Air Power in 1962.pdf. Accessed on April 24, 2024.
34. Singh, n. 21, pp. 72-75.
35. Diptendu Choudhury, *1971 India-Pakistan War 50 Years Later* (New Delhi: Pentagon Press LLP, 2022), pp. 115-137.
36. n. 17.

fighter aircraft.[37] Owing to their larger size, bombers can not only carry more numbers but can also accommodate large-sized weapons. These, combined, with the long range of the platform, enhance the stand-off targeting options. For example, the range of one Kh-BD class of missile carried by the Tu-160 bomber is more than 6,000 km. One Tu-160 can reportedly carry a total of 12 of such weapons, thereby complementing reach with offensive lethality.[38] Carriage of stand-off weapons of such calibre enables the bombers to launch their weapons at ranges well outside the lethal envelope of the land as well as ship-based AD of the adversary.

Secondly, the long range missions undertaken by fighter aircraft would generally require the FRA to accompany the package. On the contrary, being able to carry more fuel internally, the bombers can fly for much larger ranges without the requirement of aerial refuelling. In addition, owing to their ability to fly at extended ranges, bombers can be deployed in depth which will ensure inherent protection from the enemy's counter-air operations. The capability to loiter for a longer duration will also ensure a quick response to a rapidly developing and recurring situation.

Thirdly and, most importantly, bombers offer simultaneous employment of a diverse range of conventional as well as specialist weapons. For example, the B-2 aircraft can simultaneously carry a mix of tens of conventional bombs such as the Mk-82 and GBU-38 as well as multiple B61 or B83 nuclear bombs. Being able to do so, it is available for conventional as well as strategic missions without any requirement of configurational changes.[39] Owing to the ability of bombers to carry a larger quantity of armament load, the fighter aircraft can be released from the strike role and can instead be used for other essential tasks such as escorts and electronic warfare. The ability to carry more weapons will also shrink the overall force package and enable engagement of multiple targets in a single mission.

37. Available at https://en.wikipedia.org/wiki/Tupolev_Tu-160. Accessed on April 23, 2024.
38. Thomas Newdick, *The Warzone*, September 19, 2023, available at https://www.twz.com/lets-talk-about-russias-new-long-range-kh-bd-cruise-missile. Accessed on April 24, 2024.
39. Available at https://en.wikipedia.org/wiki/Northrop_Grumman_B-2_Spirit. Accessed on April 26, 2024.

In the face of the rapidly proliferating air defence capabilities of the Pakistan Air Force, the stand-off ability to strike without exposing own forces will complement India's conventional deterrence against its western adversary.

In a conflict in the conventional domain, bombers will not only be able to undertake depth strikes against China's airfields and command and control centres but will also ensure interdiction of communications and sustenance networks located well inside the TAR. Apart from undertaking depth operations, bombers with their stand-off weapons will also be able to undertake strikes in the Tactical Battle Area (TBA) closer to the LAC while remaining well inside own territory. The ability of doing so while staying outside the adversary's AD network will provide the bombers definitive freedom of operation with impunity. This will also obviate the employment of tactical platforms in the dense AD environment to a certain extent and thereby prevent their unwarranted exposure to enemy's AD.

While the paper primarily argues on the role of bombers in India's response options against continental and maritime threats emanating from China, their employment during hostilities with Pakistan would accrue similar dividends. In addition to the counter-air targets, a majority of the targets of strategic interest inside Pakistan such as command and control centres, power grids, communication network, economic hubs and vital maritime centres will be within the reach of bomber aircraft. In the face of the rapidly proliferating air defence capabilities of the Pakistan Air Force, the stand-off ability to strike without exposing own forces will complement India's conventional deterrence against its western adversary.

CAN STRATEGIC BOMBERS SURVIVE CONTESTED AIRSPACE?

Another aspect that requires fresh deliberation is the vulnerability of bombers compared to more agile and manoeuvrable fighter aircraft. When we speak of bombers, some of us paint a mental image of the hapless large raids of heavy aerial platforms of World War II being ruthlessly

shot down by the enemy's anti-aircraft artillery. The modern-day bombers, while relatively slower in speed, have evolved in self-protection capabilities. Unlike the rudimentary bomber aircraft of World War II and the early Cold War era, modern day bombers are far more advanced in terms of both active as well as passive self-defence.

The development of long range hypersonic weapons and their ability to strike expeditionary carrier task forces with impunity may also encourage these countries to fall back on the proven capability of bombers.

The successful employment of stealth bombers such as the B-2 in past conflicts has driven countries such as the USA, Russia and China to further upgrade these platforms and develop next generation stealth bombers such as the B-21, Tu PAK DA and H-20.[40] The development of long range hypersonic weapons and their ability to strike expeditionary carrier task forces with impunity may also encourage these countries to fall back on the proven capability of bombers.[41] Notwithstanding the stealth technology, from active jammers to a large and diverse scale of passive counter-measures, the bombers are either already fitted or can be retro-fitted and upgraded with state-of-the-art electronic warfare suites to enhance their survivability.[42] Owing to these capabilities, the survivability of bombers in a hostile environment is as good or as bad as any other aerial platform as far as electronic warfare is concerned. In fact, due to its large size and, hence, more space available onboard the platform, the active jammers onboard the bomber could be bigger in size and, therefore, will be able to generate more power. This would directly enhance the ranges at which bombers will be able to affect jamming operations against both aerial and ground-based electronic warfare systems.

40. Air Marshal Anil Chopra, *The EurAsian Times*, May 11, 2024, available at https://www.eurasiantimes.com/chinas-h-20-stealth-bomber-threatens/. Accessed on April 27, 2024.
41. Group Captain TP Srivastava, *The Eurasian Times*, May 6, 2024, available at https://www.eurasiantimes.com/no-aircraft-carrier-chinese-hypersonic-missile/. Accessed on April 30, 2024.
42. "B-2 Survivability Against Air Defence Systems", March 1990, available at https://apps.dtic.mil/sti/tr/pdf/ADA235368.pdf. Accessed on May 4, 2024.

The slow speed of bomber platforms is one aspect that evokes the criticism of a few. Unarguably, the slow speed aerial platforms are inherently vulnerable in an airspace contested by high-speed platforms, long range aerial weapons and advanced air defence systems. Hence, going by this logic, bombers as slow movers, will be vulnerable in an intense aerial battle. However, judging the vulnerability quotient of these platforms solely by their size and speed may not be fair. Like other slow speed platforms such as communication jammers and search and rescue platforms, bombers can inherently be embedded within a composite offensive package and may not be employed in isolation without protection. Such packages include offensive sweep, escorts, air defence aircraft, electronic warfare aircraft, and will even be complemented by long range ground-based air defence systems. Flying embedded in these packages can provide bombers as much protection as any other tactical strike aircraft.

Also, as brought out earlier, the marked superiority that bombers enjoy compared to other aerial platforms is not merely in their ability to fly at longer range but also in carrying long-range stand-off precision air armament. The aspect being highlighted herein is the superior stand-off precision capability as compared to conventional tactical strike platforms wherein the bombers will launch their weapons without even having to breach the lethal envelope of air defence weapon systems. Overall, the advanced self-protection suites and ability to carry stand-off weapons of much higher ranges as compared to traditional tactical strike aircraft will ensure a better survivability rate for the strategic bombers.

BANG FOR THE BUCK: COST TO OUTPUT ANALYSIS

Some argue that the global aspirations of countries such as the USA, Russia and China leave them with little choice but to continue to develop their respective bomber fleets, whereas India's strategic requirements as well as security concerns may not warrant the acquisition of such capability. In view of the prevailing geopolitical environment and the role that India aspires to play in the emerging world order, this assumption could not be

more wrong. Such assumptions are sometimes made to justify not acquiring bombers due to the higher cost involved. Bombers undoubtedly comprise an expensive commodity to own and maintain. However, the assumption that these are the 'most expensive' amongst other alternatives may not be accurate. A comparative analysis of various platforms in different categories, as shown in Table 1 below, examines the aspect of cost vs output.

Table 1: Approximate Cost of War-Fighting Assets

Platform	Cost of One Aircraft	Cost of One Squadron (18 aircraft per squadron)
4.5 Gen Fighter (Rafale)[43]	US$ 200 Million	US$ 3.6 Billion
Tu-160 Bomber[44]	US$ 270 Million	US$ 4.9 Billion
B-21 Stealth Bomber[45]	US$ 700 Million	US$ 12.6 Billion

The analysis from the table indicates that the cost of one complete squadron (assuming to comprise a total of 18 aircraft) of the Tu-160 class of bomber aircraft will be US$ 4.9 billion. This is marginally higher than one squadron of 4.5th generation tactical fighter aircraft of the Rafale class. If each Rafale aircraft can deliver a total of nine tonnes of air-to-ground armament load and all the aircraft of one squadron are solely used in this role, the total weight of attack by 18 Rafale aircraft in one wave will be 162 tonnes. Considering the load carrying capability of a Tu-160 bomber to be 40 tonnes per aircraft, it will take only a total of four bombers to deliver an armament load of 162 tonnes as against 18 Rafale aircraft. This implies that against 18 Rafale aircraft worth US$ 3.6 billion, only four Tu-160 bombers costing US$ 1.08 billion will suffice to undertake the said task. Conversely, for the same cost of US$ 3.6 billion, a total of 13 bombers

43. Available at https://en.wikipedia.org/wiki/Dassault_Rafale. Accessed on April 20, 2024.
44. Available at https://currentaffairs.adda247.com/india-to-buy-six-tu-160-long-range-bombers-from-russia/amp/. Accessed on April 20, 2024.
45. Available at https://en.wikipedia.org/wiki/Northrop_Grumman_B-21_Raider#:~:text=The%20versions%20of%20the%202017,at%20%24700%20million%20per%20aircraft. Accessed on April 20, 2024.

Based on the emerging security necessity and how deep our pockets are, we may have to either procure or even exercise the option of leasing a modest yet effective platform such as the Tu-160.

will be able to deliver a total of 520 tonnes of armament load, a mammoth 3.2 times the load of one entire squadron of Rafale aircraft.

These calculations do not even include the fact that the armament load of the class of Kh-55 long range missiles carried by a strategic bomber will be much more lethal in both range as well as calibre as compared to a tactical fighter aircraft. While the open-source figures quoted in these calculations may not be absolutely accurate, they speak for themselves in approximation. It is reiterated that these analogies, by no means, undermine the potential that any other asset/platform has to offer. The purpose is solely to substantiate the argument that for the output they can deliver, bombers aren't as costly as usually assumed. It is further reiterated that the threat assessment undertaken earlier in this paper has already made it evident that acquiring long range strike capabilities in the present context is not a luxury but a necessity for India. To make matters worse, the dwindling strength of fighter squadrons with the IAF will be one of the most over-riding constraints in the application of its air power in offensive role across a highly contested battlespace.

To conclude the argument, our economic wherewithal and the crunch in the basic strength of fighter squadrons may govern our decision to not procure the bombers for the time being. However, considering India's aspirations, the threat dynamics in India's security construct, and the rapidly expanding capabilities of our adversaries, disregarding the need to acquire strategic bombers in entirety may not be prudent in the long run. Based on the emerging security necessity and how deep our pockets are, we may have to either procure or even exercise the option of leasing a modest yet effective platform such as the Tu-160. Such options of leasing have been exercised by India in the past while leasing the Akula class attack submarines from Russia and the MQ-9B surveillance drones from the USA. Similar arrangements

on an emergent case-to-case basis may be explored for the strategic bombers too. In the long term, as our domestic manufacturing capacity and expertise develop, we must consider indigenous development of these platforms to reduce dependence on others.

Whether we accept it or not, the ability to undertake long range strikes will be an inevitable necessity in India's war-fighting dynamics. This ability can be attained and delivered through the acquisition of strategic bombers.

CONCLUSION

To prosper and meet India's regional as well as global aspirations, security in our own backyard and the ability to influence the environment in the desired regions are a must. In this paper, the threat assessment across the TAR and maritime domain has identified certain constraints in our potential, especially in terms of reach. Timely modernisation of platforms and infrastructure would go a long way in capability development. Whether we accept it or not, the ability to undertake long range strikes will be an inevitable necessity in India's war-fighting dynamics. This ability can be attained and delivered through the acquisition of strategic bombers. The rapidly proliferating AD network of the adversary demands employment of long-range stand-off precision guided weapons against it. Similarly, the probability of the use of depth airfields by China in a future air campaign is on the rise which will directly influence the contest of control of the air over the battlefield. Any success of multi-domain military operations undoubtedly depends on control of the air.

Further, the threat mosaic in the maritime domain demands swift, frequent and lethal application of the nation's military prowess. Strategic bombers can prove to be an optimum and cost-effective solution to these security challenges. These platforms will provide flexibility of employment in terms of a diverse and much more lethal arsenal which can engage and neutralise the enemy's target systems at vast ranges while retaining the economy of effort. Being a part of land-based air power, the bombers will mitigate the constraints of tactical strike aircraft and maritime war-fighting vessels. While

being employed in conventional roles, the bombers will also strengthen the nuclear triad, and promise two most crucial elements of a strategic strike: accuracy and surprise.

This paper by no means tries to suggest that acquisition of bombers can substitute the procurement of the requisite number of tactical fighter aircraft. It just highlights that the acquisition of bombers will relieve the fighter fleet from undertaking roles concerning long-range strikes and, instead, help divert it to perform other roles considered obligatory in a composite offensive air package. The paper concludes that in the present continental and maritime security construct of India, strategic bombers will prove to be the '*bang for the buck*'.