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Impact of PLAAF in Integrated Operations 2035

Ashminder Singh Bahal

CENTRE FOR LAND WARFARE STUDIES

Field Marshal Sam Hormusji Framji Jamshedji Manekshaw, MC, better known as Sam "Bahadur", was the 8th Chief of the Army Staff (COAS). It was under his command that the Indian forces achieved a spectacular victory in the Indo-Pakistan War of 1971. Starting from 1932, when he joined the first batch at the Indian Military Academy (IMA), his distinguished military career spanned over four decades and five wars, including World War II. He was the first of only two Field Marshals in the Indian Army. Sam Manekshaw's contributions to the Indian Army are legendary. He was a soldier's soldier and a General's General. He was outspoken and stood by his convictions. He was immensely popular within the Services and among civilians of all ages. Boyish charm, wit and humour were other notable qualities of independent India's best known soldier. Apart from hardcore military affairs, the Field Marshal took immense interest in strategic studies and national security issues. Owing to this unique blend of qualities, a grateful nation honoured him with the Padma Bhushan and Padma Vibhushan in 1968 and 1972 respectively.

Field Marshal SHFJ Manekshaw, MC
1914-2008

CLAWS Occasional Papers are dedicated to the memory of Field Marshal Sam Manekshaw

Photographs courtesy: The Manekshaw family/FORCE.

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Prelude

Till 1993, the People's Liberation Army (PLA) played a major role in China's strategic thinking, with air, space and naval forces meant to support land forces. Subsequently, reprioritisation was undertaken in 2004, and the People's Liberation Army Air Force (PLAAF) and People's Liberation Army Navy (PLAN) were allotted strategic roles. PLAAF, the third largest Air Force in the world, maintains approx. 398,000 personnel, 150 airbases and around 2,000 fighter/bomber aircraft. Both PLAAF and PLAN have around 2,800 aircraft including 2,250 combat aircraft.[1] The number of aircraft in an aviation regiment ranges from 20 to 40—the ratio of aircraft to pilots is typically 1:1.2.

PLAAF Orbat

From 2011, the PLAAF reorganised from a Corps – Division – Regiment – Battalion model to a Base – Brigade – Battalion structure. The PLAAF is likely to:

(a) Establish ten bases, one to three per Theatre Command (TC), with each base having four to five Air Brigades.
(b) Airborne Corps is now administratively brought under PLAAF but operationally controlled by the Central Military Commission (CMC). This includes six Airborne Brigades and one Special Operations, one Airborne Support and one Aviation Brigade.
(c) PLAAF has sixty Combat Brigades, 25 Combat/Transport/Special Mission Regiments, 24 Training Brigades, one Air Defence (AD) Division and 21 AD Brigades.[2]
(d) The Eastern, Northern and Central Theatre Commands are likely to have two bases each, Western TC, three, and Southern TC one base.

Fighters

PLAAF has over 1,000 third/fourth/fifth-generation fighters comprising 40-60 J-20, 468 J-10, 225 J-11, 128 J-16, 32 Su-27, 24 Su-35 and 73 Su-30 MKK. Its fifth-generation stealth fighters comprises J-20 carrying PL-10/15 Air to Air Missiles (AAMs) and F-31/J-31. Currently, PL-16 is under development and the J-20 production rate is around 20-24 aircraft per year. J-16D has

wingtip electronic sensing pods and four jamming pods on wing stations.[3] By 2025–26, PLAAF is expected to deploy around 1,300 fourth/fifth generation fighters.[4] A combination of J-20 with J-16D Electronic Warfare (EW) aircraft provides means to attain local air superiority at the commencement of conflict.

Bombers

There are 211 H-6 Badger bomber variants with PLAAF and PLAN. H-6 carries six Air Launched Cruise Missiles (ALCMs)/CH-AS-X, Air Launched Ballistic Missiles (ALBM, which can carry nuclear warhead too), provides long-range standoff and precision strike capability. They are also developing H-20 stealth bomber with low Radar Cross Signature (RCS).

Air Transport/Early Warning/Aerial Refuelling/EW Aircraft

There are 18 Y-20 heavy lift, 24 IL-76, 23 Y-9, 49 Y-7 and 80 Y-8 transporters. PLAAF can transport three Airborne Brigades within 48 hours. 4 KJ-2000, 11 KJ-200, and 14 KJ-500 Airborne Early Warning (AEW)/Airborne Warning and Control Systems (AWACS) aircraft are used to detect, track and provide targeting information. These aircraft incorporates state of the art Active Electronically Scanned Array (AESA) technology with advanced radar modes, large search volumes and potential to detect and simultaneously track hundreds of targets. Three AN-30, eight TU-154 and 17 Y-8 aircraft are used for EW role. HY-6K, IL-78 and Y-20U are used for aerial refuelling. Y-20U aircraft was utilised for the first time for aerial refuelling in Taiwan Air Defence Identification Zone (ADIZ) in November 2021.

Helicopters

Z-8 is the Chinese variant of French SA-321JA utility helicopters. PLAN uses 14 such helicopters for ASW/SAR role. PLA uses several Z-8K/KA and Z-8B helicopters that are equipped with SATCOM antennas/Radar Warning Receivers (RWR)/Missile Approach Warning Systems (MAWS) and PLAAF utilises 34 Z-8/KH, which also incorporate chaff/flares. Modified Z-8L helicopters are being inducted in 161 Air Assault Brigade with capability to carry 'underslung all-terrain vehicles'. Eighty Z-9 variants are used by PLA/PLAN/PLAAF for troop transport, anti-tank, communications, artillery spotting, ASW/SAR and other armed roles. Z-19 are used in scout/attack roles.

Z-20, a copy of UH-60 Blackhawk, carrying 12-15 troops, vehicles and artillery pieces with total load carrying capacity of 5 tonnes, was operated at Lhasa. It can also carry missiles on pylons and can be used at 5–6 km

altitude. 150 WZ-10 medium attack helicopters with army aviation units, incorporates HJ-10s (Hellfire class ATGMs), 08 TY-90 Air to Air Missiles, and 70 mm rockets in anti-armour and battlefield air interdiction roles. In January 2022, Pakistan finally cancelled the T-129 deal with Turkish Aerospace Industries (TAI) and decided to procure the Chinese Z-10ME attack helicopters.[5] 12 Z-11s are used in training roles. There are also 16 Mi-17 armed medium multi-utility helicopters. China has adequate number of helicopters/attack helicopters to undertake most battlefield tasks to support PLA operations at medium to high altitudes.

UAVs, UCAVs and Drones

More than 80 per cent of the civilian drones in the world are made by Chinese companies. China is developing a large armed drone force and has planned eleven drone bases on the coastline for maritime surveillance in disputed areas of the South China Sea. The PLA has, since 2020, used logistics drones that are specifically designed for high altitude, low oxygen and mountainous terrain in Tibet to deliver food, medicine and ammunition to troops. Chinese manufacturers are developing thousands of mini/micro drones fitted with missiles or warheads that could operate in sync, identifying and attacking targets whilst overwhelming defences by their sheer numbers. Over 1,200 drones are available with the PLA, PLAN and PLAAF.

(a) MALE[6] drone fleet consists of BZK-005 (Giant Eagle) with an electro-optic (EO) sensor turret. The GJ-1 and GJ-2 are also MALE UAVs in strike role and are variants of Wing Loong I and Wing Loong II platforms.[7] Wing Loong is an armed UAV carrying laser guided HJ-10 anti-tank missiles. The larger GJ-2 has a chin-mounted synthetic aperture radar with longer target acquisition range. GJ-1 and GJ-2 are equivalent of MQ-1 (Predator) and MQ-9 (Reaper) drones.

(b) CH-3, a fixed wing UCAV, carries Anti-Radiation Missiles (ARM), GPS munitions and Air-to-Surface Missiles (ASM). Ch-6 is a high-altitude long endurance UAV capable of flying for 20 hours at 800km/hr speed carrying air to ground missiles or precision bombs up to 450 kg. They are also developing twin-tailed three engine Scorpion drone that can fly up to 7,000 km at 10 km altitude.

(c) High Altitude Long Endurance (HALE) WZ-7 drones, with capabilities similar to Global Hawk, were deployed at Tibet.

(d) AEW UAV, Divine Eagle, will become operational by 2035.

(e) GJ-11 (Sharp Sword), a stealthy UCAV[16], has a combat radius of 1,000 km and carries 500 kg/100 kg guided bombs. They may be used for

autonomous missions, swarming and manned-unmanned-teaming (MUMT) roles.

(f) Anjian (Dark Sword) UCAV details are not clear, but reports suggest that it could also be a Global Hawk class HALE UAV.

Air Defence (AD) Systems

China's AD system is composed of reconnaissance and surveillance, command and control, ground AD, integrated support and civil AD. PLAAF acquired additional 15 S-300 Surface-to-Air (SAM) batteries in 2010 and re-engineered a comparable indigenous HQ-9 system. China has deployed HQ-9 batteries at Chumbi Valley and has also constructed a SAM site near Lipulekh Pass in the India-Nepal-China tri-junction area. PLAAF has around 192 contemporary launchers along with 490 older launchers. It has acquired six batteries of S-400 AD systems and two batteries are deployed, one at Nyingchi across Arunachal Pradesh and the other at Hotan (Xinjiang) base across Ladakh. China has also deployed HQ-22 Medium Range (MR) SAMs, HQ-17 Short Range AD Systems (SHORADS) and LY-80 MR-SAMs in Tibet and Xinjiang. The number is adequate to protect most VA/VPs. HQ-2 systems have now been phased out and bulk of the PLAAFs SAM inventory comprises of S-300, S-400, HQ-9 and HQ-22 systems.[8]

There are 12 PLAAF operated SAM sites in Tibetan Autonomous Region (TAR), including the ones coming up at Pagri, Nariyong, Shigatse, Mansarovar, Lhasa-Gonggar, Linzhi and Pangda. They can house HQ-9, HQ-22, LY-80/HQ-16 SAMs.[9] These sites are positioned to create airspace denial against intruding aircraft that are likely to employ terrain-masking flight-profiles.[10] They have also created a 85 AD Brigade MRSAM and SHORADS training centre at Lhasa. The China Advanced Info-Optical Network project connects TAR with China through a widespread optical fibre cable network and Very Small Aperture Terminal satellite stations, and plays an important role in establishing an effective PLA command and control network.[11] It has therefore developed a strong integrated AD architecture at TAR that is able to deter different type of threats including drones/helicopters/fighters/bombers and ballistic missiles from low to medium/high altitudes. Prior to full time commencement of air operations at TAR, this integrated AD structure will need to be degraded.

PLAAF Command and Control Structure

In 2016, China created a flat command-and-control structure and enhanced CMC's authority. PLAAF HQ is now responsible for 'force accretion' and

directs the manning, training and equipping of units. The Theatre Commands (TC) are likely to fight all future wars. Since 2016, the PLAAF has reduced the Military Region Air Forces (MRAFs) to five, and renamed them as Theatre Command Air Forces (TCAF). All five TC HQs have one permanent Army and Air Force Deputy Commander.

Since 2010, PLAAF has created air brigades by lowering fighter and bomber divisions and upgrading regiments. These brigades are subordinate to bases, except nine divisions that have remained subordinate to PLAAF HQ/TCAF HQ as they have special mission aircraft that fly across TCs and require a higher level organisation to co-ordinate. PLAAF has created several UAV brigades. They provide effective reconnaissance and quick response battlefield air support. The Z-20 and GJ-2 drones are utilised at high altitude terrain.[12]

The PLAAF's enmeshed CCP structure executes political control and intervenes in decision making at each level. PLAAF units up to company level and incorporates party members. This is a weak area of PLAAF and could be seen as a strategic weak link in operational decision making, and in rapid progress of integrated operations.

PLAAF's Modernisation Drive

As assessed by the author, PLAAF's short to medium term goal is to create a modern fourth-to-fifth generation aerospace power that is capable of regional dominance by 2035, and the long term (2049) goal is to possess global reach with full spectrum aerospace dominance whilst building unmanned, stealth, DEW and space capability. By 2035, PLAAF's modernisation drive will bring insubstantial superiority in fifth generation aircraft, Directed Energy Weapons (DEW), space-based assets, anti-satellite weapons (ASAT), UCAVs, network centric warfare technology, anti-ship ballistic missiles (that target aircraft carriers to promote anti-access area denial strategy), AWACS and strategic air lift assets. There will also be significant integration of artificial intelligence in equipment, weapon systems and command and control structures.

PLAAF has upgraded itself with '20' series aircraft that include stealth J-20 fighters, Y-20, the long-range transporters, H-20 that matches US B-2 stealth bomber and Z-20 helicopters.[13] China has also developed a 500-km range V-750 unmanned helicopter that test fired anti-tank missiles in June 2017.[14] PLAAF considers stealth and unmanned platforms as key force enablers and has developed S-37A fighter to counter F-22 Raptor.[15] It is also developing a JH-XX stealth bomber. These aircraft give China the ability to undertake stealthy strikes deep inside India.[16] India's fifth-generation

fighter aircraft (FGFA) project has stalled, and the Advanced Medium Combat Aircraft (AMCA) project will take a long time to fructify, considering the slow speed at which the DRDO agencies function.

UAVs are being used to train infantry personnel to undertake beyond visual range targeting.[17] China flew WJ-700 HALE drone in 2021[18] and a high-frequency surface wave radar designed to locate stealth aircraft[19]. China is developing two air-launched ballistic missiles (ALBMs) including one with nuclear capability that is integrated with H-6N bombers. This completes their nuclear triad. Further, they are developing a sixth-generation fighter, which by 2035 will be equipped with auxiliary drones and AI technologies, and will provide manned-unmanned integration capability.[20] This increases China's technology differential, which in 2035 could create strategic disparity between the two countries.

They also intend to make China a global AI leader through Military-Civil Fusion (MCF) and have placed military innovation at the centre.[21] The future of AI is related to the development of autonomous systems that demonstrates an independent capacity for expert-based reasoning that relies on coupling the perception-cognition-action loop, which implies that actions will typically come within seconds of a stimulus.[22] They have advanced from 'Informatised Warfare' to 'Intelligentised Operations'. 'Intelligentisation' is a uniquely Chinese concept of applying AI and processing power to military planning, operational command, and decision support.[23] It is seen as operationalising AI and its enabling technologies, such as cloud computing, big data analytics, quantum information and unmanned systems, for military applications.[24] Intelligentisation is their guiding principle for military modernisation, and they intend to integrate AI into their war fighting functions as well as to shape a new cognitive domain that leads to generating modern approaches to war fighting.[25]

China has already incorporated long-range precision strike abilities with the integration of AI and cyber capabilities.[26] In order to leverage the advantages of AI in an intelligent military, they believe that AI needs to go beyond robotics and be based on human-machine interface.[27] In 2021, China has deployed 88 Sharp Claw machine gun armed robots for surveillance and defence and 120 Mule-200 unmanned ground vehicles for transportation of ammunition and supplies within Tibet.[28] China has also made significant progress in unmanned platforms that include Wing Loong UCAV, remotely controlled tanks, autonomous amphibious vehicles, and helicopter drones such as Blowfish 2. The Chinese dominance on 5G technology helps them integrate AI technologies much better. The only thing that can disrupt

this synergy are the cyber weapons that can infiltrate networks, infect computers, dislocate signals and break down encrypted communication systems.

As assessed by the Author, by 2035, China is likely to field advanced generation fighters, numerous UCAVs, precise surface to surface missiles, including those that target aircraft carriers, cyber technologies, DEW and a number of AWACS aircraft. PLAAF would then possess abilities that help it dominate the escalation matrix at each stage of conflict, which may include political signalling, establishing no-fly zones and subsequently initiating combat operations at the time and place of their choosing at determined locations, whilst having significant integration between the three services. Although, their pilot capabilities are suspect by Western/Indian standards, improvements in combat training, especially their experience gained through integrated PAF exercises, is likely to enhance their combat potential[29] significantly.

Chinese Space Threat

China's 2015 White Paper identifies space as a new domain of warfare and their plans include building space stations, manufacturing reusable space shuttles and developing potent counter satellite capability leading to space control. During hostilities, tasks could include Surveillance and Reconnaissance (including SIGINT and ELINT), Navigation, Targeting, Space Control, Communications and Space Protection.

People's Liberation Army Strategic Support Force (PLASSF)

PLASSF was created on 31 December 2015 to integrate application of space based assets, electromagnetic spectrum and cyberspace. Its Space Department places all major components of China's space programme under a unified command, thereby increasing its efficiency and efficacy.[30] It leads to development of military space doctrine, including counterspace doctrine, while the PLA Rocket Force controls operationally deployed ASATs.[31]

China's Launch Capability

In 2003, China launched its first human into space.[32] Between 2010 and 2019, China conducted 207 launches, more than one-and-a-half times the number of launches it carried out in the previous four decades. More than one-fifth of these launches took place in 2018 and 2019 alone.[33] China undertook 55 launches in 2021—their highest ever and more than that of US and

Russia. On 29 April 2021, Tianhe, the 22-tonne core module of Tiangong Space Station, was successfully launched into Low Earth orbit indicating the commencement of the construction of a Chinese Space Station.

Reconnaissance Capability

Of around 4,000 satellites worldwide, over 430 belong to China. Currently, 68–75 satellites are being put to military use. There are 3 types of Yaogan satellites that has been developed—optical reconnaissance, synthetic aperture radar for day-and-night all-weather observation, and trios of ELINT satellites. Between 2017 and 2019, China launched 15 dual use ISR satellites and launched the first of 10 remote sensing satellites under the Hainan Satellite Constellation project to 'maintain uninterrupted observation' of South China Sea.[34] Eighty-three Yaogan satellites are used to identify, locate and track Aircraft Carrier Groups sailing in the Pacific Ocean for directing missile attacks. It has 3 Gaofen 11 satellites which are optical and radar satellites with 4 inches (10 cm) resolution that form China High-resolution Earth Observation System.[35] It has been assessed by the author that China has already mapped every inch of TAR and its adjoining areas, and Arunachal Pradesh and other Northeast locations including Sikkim and Ladakh regions in India.

ELINT / SIGINT

China have deployed space based ELINT as part of its surveillance architecture for tracking and targeting maritime/land assets. Ziyuan (ZY) are remote sensing satellites[36] that forms a Naval Ocean Surveillance System that enables them to accurately pinpoint naval ships by tracking their electronic signals. At least 13 Yaogan satellites are also utilised for dual use in EO and SAR missions. Twelve satellites were launched since 2015, at 600 km altitude with 35 degrees inclination, and each triplet manoeuvred so that they were 120 degrees apart. The third and fourth triplets were moved to occupy the same orbital plane with 6 satellites spaced 60 degrees apart. The architecture of 12 satellite constellation is aimed to achieve a continuous ELINT surveillance between 35 degrees north and 35 degrees south[37], thereby covering the entire South China Sea. The ELINT/SIGINT technology intercepts electromagnetic radiations and works with imagery sensors for strategic and naval reconnaissance[38] and they will be able to monitor the US and Quad assets that move in this region. Subsequently, this capability could be utilised for creating both soft and hard kills on aircraft carriers and other naval vessels.

Communication Satellites

Twenty-three ChinaSat satellites are designed for civil and military communications. Feng Huo-2, used for tactical communications, provides secure data and voice transmission via C-band/UHF link and ChinaSat-2 uses Ku-band.[39] Tianlian data tracking and relay satellites provide communications for crewed Shenzhou Missions and Tiangong Space Station.

Deep Space Missions

In 2019, China landed Chang'e-4 lunar probe on the Moon and a rover on Mars. In November/December 2021, their astronauts space-walked to fix a robotic arm and install a camera outside the Tianhe module. This implies that China is building significant deep space capability and will lay its claims later into any terrestrial venture.

Counter Space Capability

China has developed enormous counter-space capabilities (2007 anti-sat [ASAT] test) including ASAT missiles, Directed Energy Weapons (DEW), satellite jammers and co-orbital systems aimed to degrade and deny a potential adversary the use of space.[40] The US military has also accused China of firing laser beams at its satellites.[41] China's targeting of Low Earth Orbit (LEO) satellites imply that India's reconnaissance satellites could be at risk; there is a need to keep multiple satellites ready for launch along with launching rockets at short notice, including mini/micro satellites. India's ASAT test used a direct ascent kinetic kill weapon[42] and this capability needs to progress to other counter space technologies to include DEW and satellite jammers. India is also developing mini/micro satellites, but the pace is relatively slow. The new drone policy incorporates several encouragement initiatives that help leverage India's strengths in innovation, technology and engineering to make India a drone hub[43] and help the private sector to develop mini/micro drones.

Navigation System (BeiDou)

China's satellite navigation system BeiDou became operational in December 2011[44] wherein 55 satellites provide continuous, reliable navigation and timing services to global users.[45] Additionally, China plans to offer satellite based augmentation services, a worldwide short message service, and international search and rescue capabilities[46] to nations that are part of the Belt and Road Initiative, thereby creating a Space Silk Road. Around 30 BRI countries including Pakistan, Saudi Arabia, Myanmar and Indonesia have signed agreements to embed BeiDou services and some have even allowed

China to build ground stations to improve its accuracy.[47] This is an issue of concern as it develops regional capabilities that may significantly affect India's interests.

Space Situational Awareness

In 2015, China National Space Administration (CNSA) created its Space Debris Monitoring and Application Centre and, in 2018, China announced that it would build a monitoring base complete with large aperture space telescopes, infrared optical sensors, and radars in the Xinjiang province.[48] India's space situational architecture needs to be linked to an integrated space command.

Future Space Developments

China is developing space vehicles, satellites that can be repaired on-orbit, re-usable satellites and space robots. China launched Aolong-1 and Tianyuan-1 spacecraft, which tested satellite robotic arm grappling and satellite refuelling in orbit.[49] China is also developing rockets capable of carrying 100 tons.[50] On 15 September 2020, China's sea based launch placed nine satellites in orbit.[51] This gives them flexibility in launching satellites, besides providing redundancy.

Ballistic Missiles and Hypersonic Technologies

China has over 500 ballistic missiles including 100 ICBMs, and some with MIRV warheads.[52] They have several tracking stations: Karachi (Pakistan), Malindi (Kenya), Swakopmund (Namibia) and Neuquen (Argentina), and they also share tracking facilities with France, Brazil, Sweden and Australia.[53] In addition, DF-41, a road mobile ICBM capable of carrying multiple independently targetable re-entry vehicles and hypersonic glide vehicles[54] has been operationalised. In August 2021, China tested a missile with a hypersonic glide vehicle circling the earth in low orbit. Though the missile missed its target, the test demonstrated China's advanced space capability.[55] Most modern AD systems pose little threat to hypersonic vehicles and only Russia and China have operational hypersonic weapons; the US is still a year away from fielding its operational weapon.[56]

China is gradually building such integration that exploits rocket forces, cyber space and space based assets to paralyse the functioning of an adversary's command and control structures, information systems and their combat potential, thereby creating multi-domain dominance. This is of serious concern to the Indian Armed Forces who are grappling with inter-services integration.

PLAAF Military Diplomacy

PLAAF has increased senior level visits/exchanges and participation in numerous exercises that has involved participants from India, Russia, Belarus, China, Mongolia, Pakistan, Kyrgyzstan, Kazakhstan, Tajikistan, Uzbekistan and Armenia utilising Z-9, Z-10, Mi-17 and Z-19 helicopters and IL-76, Y-9, H-6, JH-7A and J-11 aircraft. Since July 2019, two H-6 and two Russian Tu-95 aircraft conducted joint patrols over the East China Sea and beyond the First Island Chain. Such missions have been flown in the Western Pacific even in June 2022. This implies that China's relationship with Russia is going beyond military equipment sale, technology cooperation and diplomatic support to building a counter block to NATO with North Korea, Saudi Arabia and Iran.

In addition, Airborne Corps participated in multilateral exercises with the US, Russia, Belarus, Venezuela, Indonesia and Australia. From the Eurasian region to the Western Pacific, China is increasing its inter-operability with the BRI countries that field Chinese weapon systems.[57] PLAAF Il-78 aerial refuelers landed at Skardu in June 2020 and PAF JF-17s undertook joint exercises with PLAAF at Hotan airbase in 2019. The Chinese perceive such exchanges are required to 'build and consolidate Chinese strategic points' and ensure that others 'align' with its BRI[58] initiative. Under Shanghai Cooperation Organisation (SCO), joint counter-terrorism exercises have been carried out since 2005. China, also increased its participation in UN peacekeeping operations that include Cambodia, Congo, Liberia, Sudan and Lebanon and has supplied around 10.3 percent of the UN peacekeeping budget, a sharp increase from 6.6 percent in 2016.[59] Twenty-seven transport units were dispatched for UN Missions in Liberia and Sudan that transported 1.2 million tons of material and equipment over 13 million km.[60]

PLAAF has also used IL-76 and Y-20 aircraft for foreign evacuation, and other humanitarian and disaster relief missions. Y-20s carried COVID related supplies in February 2020. PLAAF may deploy its military elements at facilities in Myanmar, Sri Lanka and Pakistan akin to Djibouti (military base operated by PLAN). Similarly, logistics support agreements/access mechanisms will be developed with countries involved with the BRI initiative. These interactions allow PLAAF to help increase China's geo-strategic footprint, bring interoperability, evaluate operational preparedness, learn operational tactics and identify how other air forces recruit, train and operate.

PLAAF-PAF Relationship

By 1980s, China provided Pakistan 75 per cent of its tanks and 65 per cent of its aircraft[61] besides assisting Pakistan in establishing Kamra rebuild

factories. Sino-Pakistan defence collaboration increased significantly under US sanctions and resulted in joint development of JF-17 fighters, guided missile frigates and K-8 trainers. Both countries have undertaken production of Caihong-5 and Wing Loong-I UCAVs[62], as well as development of stealth technology and advanced weapon systems. Pakistan has given China access to advanced US technology in terms of radars and avionics fitted on the American aircraft, which were subsequently reverse engineered by China. Pakistan currently is China's biggest arms buyer, with latest acquisitions being LY-80 AD system, 04 Type-054 frigates, 08 Type-041 submarines and 25 J-10C aircraft, thereby clearly highlighting a strategic nexus between the two. They are also negotiating for the sale of HQ-9 AD system matching S-300 capability.

China sold optical remote sensing satellites (PRSS-I) to Pakistan and launched BADR-I, Paksat 1R satellite and two remote sensing satellites, PRSS-I and PakTES-1A. Pakistan also acquired short/medium range ballistic missile technologies and cruise missile assistance from China. Since 2011, China and Pakistan commenced the Shaheen annual exercises on a rotating basis. This makes China learn Western tactics in operational scenarios. In 2017, Shaheen VI involved J-11, JH-7 and KJ-200 aircraft, PLAN aviation elements and ground forces, including SAM, radar units and airborne special forces. Pakistan also deployed JF-17 fighters and EW aircraft. The exercises incorporated day and night combat, live firing and operational exercises that involved Chinese and Pakistani pilots flying the same aircraft in that mission.

A special economic zone under China–Pakistan Economic Corridor (CPEC) is also being created to produce new generation fighter aircraft. Navigation/radar systems and weapons will then be jointly developed at factories in Pakistan. The way both the countries are currently bound together, especially in the BRI initiative, the soft loan/aid that China has given to Pakistan as its economy is floundering, the chill that has developed in US-Pak relations and the numerous joint military projects that are moving ahead at high speed, their cooperation is likely to grow further. A strong Sino-Pakistan nexus suits both the countries as it presents India with a potential two-front war scenario.

Risk Assessment and PLAAF Strategy and Operational War Fighting Doctrines

China has increased its aggressive involvement in global affairs, South China Sea, Indian Ocean, its Belt and Road Initiative, that has led to debt trap fears and in turn has furthered its geo-strategic footprint, its trade wars, covert support in nuclearisation of the Korean subcontinent, and its spread

of COVID-19. Added to this is the situation of radicalisation of Afghanistan, Iraq, the Middle East and Syria, all of which have seriously impacted the geo-strategic situation. This is further heightened by China's hostile power display in Taiwan Straits (especially after Nancy Pelosi's visit), Senkaku Islands and all along the LAC. The global geo-politics is further affected by the diminishing American influence and power, especially in the Indo-Pacific, where quadrilateral and related initiatives are being progressed, albeit slowly, to safeguard interests. Post commencement of the Russia-Ukraine war, the US is trying to maintain its pre-eminence by using EU and other countries to create a Cold War-like situation and divide the world in terms of Russia, China, Iran, North Korea and Syria on one side, and the US and the entire Western world and some other countries on the other side. This has further complicated the global geo-economic strategic environment.

In this continuously evolving global environment, China's Military Strategy (2015) states that, 'PLAAF will shift focus from territorial air defence to both defence and offence and build an air-space defence force that meets the requirements of informatised operations' (note the change from defence to defence and offence).[63] PLAAF's strategy is currently focused to conduct systems degradation and destruction, the aim being to paralyse, disable or destroy the adversary's entire war fighting machinery rather than cause piecemeal attrition on individual weapon systems/elements.

In 'Opinion on Deepening the Reform of National Defence and the Armed Forces' (2016), CMC reviewed the roles to be undertaken at the national, theatre and service levels and made the services HQ responsible for force accretion (manning), training and equipping, whilst the war fighting was to be executed by different TCs. An operational doctrine on joint operations and a mobilisation order was issued in November 2020 and in January 2021 that exhort the armed forces to improve joint operations in combat. These measures strengthen China's power projection capabilities even in the Indian Ocean Region.[64]

As far as PLAAF is concerned, it has adopted the 'strategic air force' concept:

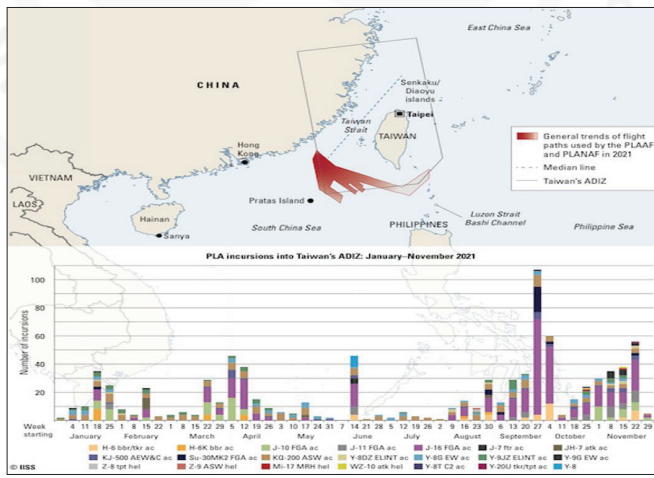
1. to assist in attaining national 'reunification' (Taiwan)
2. assist to build overseas economic and military presence through BRI
3. assist to assimilate key locations in Ladakh, Arunachal Pradesh and Bhutan that give it operational and strategic advantage at TAR
4. attain air and maritime dominance in the First Island Chain
5. increase visibility in the Indian Ocean region, including developing artificial islands

6. safeguard national territory (including presence at Djibouti as well as at other places)
7. conduct 'active defence' (Southern and Western Theatre)
8. help implement anti-access/area denial strategy
9. undertake diplomacy missions, humanitarian assistance and disaster relief operations.

In 2014, PLA's strategic guidance was revised to win 'informatised local wars'. PLAAF's use of space based systems continues to increase as its combat arms focus on leveraging information to fight integrated battles whilst denying information dominance to its adversaries. The emphasis is on counter space warfare and net centric operations in cyber and electronic warfare domains. Structural reforms integrate the organisational structure, while operational reforms equip them with weapons and firepower necessary to fight in different scenarios.[65] PLAAF plays a crucial role in 'joint anti-air raid campaign' as part of 'active defence' to attack the enemy's air and naval bases.[66]

PLAAF will continue 'open/far-seas' training whilst engaging in long-range sorties over seas to ensure that their pilots are ready for offshore contingencies. Since 2015, PLAAF has increased joint training with PLAN Air Force; Sharp Sword 2015 and Joint Sea 2015 exercises (with Russia) are examples in case.[67] Vertical envelopment could be carried out by PLAN to project power and seize island territories (Taiwan). PLAAF has conducted more than 3,000 sorties in Taiwan's ADIZ in 2020–21, as shown in **Figure 1** below.

Figure 1: China's Incursions in Taiwan's ADIZ



Source: 'Military Balance 2022'; Asia-China

In October 2021, there were 145 PLAAF aircraft that violated Taiwanese ADIZ in 4 days.[68] After Nancy Pelosi's visit to Taiwan in August 2022, over a hundred aircraft and over a dozen ships were deployed, holding multiple exercises around Taiwan, crossing the median line. China also fired ballistic missiles, around and over Taiwan, some of which landed in Japan's Exclusive Economic Zone. The scale and intensity of these exercises was much larger than ever before and indicated a new normal in China-Taiwan's deteriorating relations. As more visits are taking place by American legislators, as well as representatives from Japan and other countries and also the defence modernization is being enhanced by Taiwan and Japan, the window for re-unification for China is closing and they would therefore in near future intensify their re-unification drive.

Besides political signalling, China undertakes such missions to create psychological pressure on Taiwan to re-unify without fighting a war, or whenever Taiwan tries to come closer to other countries or intends to test Taiwan's operational readiness to camouflage the actual D-day operations, map electro-magnetic spectrum as also to test the resolve of the Western nations before it undertakes actual re-unification. The PLAAF is currently capable of conducting bomber operations past the first island chain and has deployed transport aircraft and airborne units till Turkey, Australia and Venezuela.[69]

China has also infiltrated at several locations in Ladakh, Uttarakhand, Arunachal Pradesh and Bhutan. Their focus is to develop border villages, heliports and military infrastructure, thereby giving permanence to Chinese claims. China has also adopted a new border law and has named fifteen places in Arunachal Pradesh with Chinese names, whilst calling Arunachal Pradesh South Tibet. These measures clearly indicate a provocative offensive stance to resolve border issues on China's terms in the long run. It can be expected that if China is able to carry out re-unification of Taiwan, its next focus area would be Ladakh followed by Arunachal Pradesh with Tawang as its first objective.

PLAAF is three times larger than IAF, has a strategic bomber fleet, more AEW/AWACS aircraft, and numerous armed drones. It has a strong integrated air defence and has deployed two batteries of S-400 at TAR, besides numerous S-300 and HQ-9 batteries. It has favourable stealth differential and counter space and ballistic missile capability. It is assessed that by 2035, China will employ a mix of manned and unmanned aerial platforms effectively in integrated operations, with possible drones swarming capability to overwhelm Indian defences.

The future warfare portends that integrated forces must possess resilience and coherence to operate across multiple domains without incurring fratricide, and the surface forces must have the ability to conduct fast-paced manoeuvres by applying cross-domain fires and maximising the potential windows of opportunity. Further, conducting these operations in high altitude areas with inherent terrain friction will have its own challenges. This is where the role of aerospace power, cyber Artificial Intelligence and integration between air force and the army assumes significant importance at TAR. Combat operations are likely to take place in a challenged operational environment where more than physical degradation, functional paralysis will become important.

To achieve large scale and high intensity combat operations, the focus will move beyond the chosen targeting of command, control and communication nodes by manned or unmanned elements (which is also necessary), towards targeting the adversary's AI technologies with the help of cyber warfare, whilst protecting own capabilities and providing aerial logistics support in mountainous areas in desired timeframes.

This will bring important changes in the operational concepts and would include obtaining multi-domain dominance rapidly, which implies dominating the AI and cyber dimensions at the commencement of the conflict. After the Galwan Valley incident, China launched hundreds of cyber attacks against Indian companies and computer systems. The focus here will be to target 'the will' of the adversary by neutralising its ability to function. Currently, the Indian Armed Forces are lagging behind from this type of integration as well as in AI/cyber capability, even if we commence the integration process today. The other integration that is required is between integrating space based functions with application of several drones in the common tactical area in high altitude terrain whilst ensuring that the drones have a single chain of command. This again implies significant integration between the Indian Army and the Indian Air Force. It is here that a joint doctrine between the three services is required.

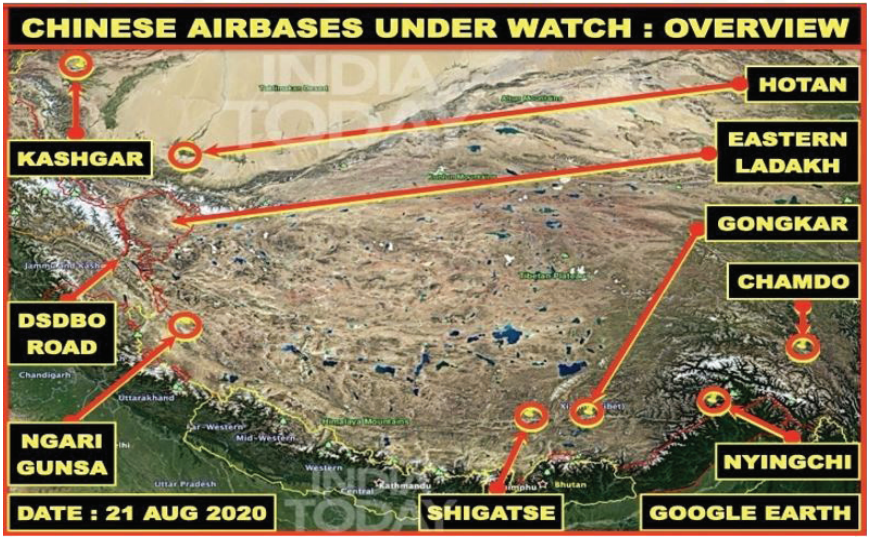
PLAAF adopts a 'light front, heavy rear' approach, which implies aggressive attacks by utilising 'rear bases' to launch strikes and utilising 'forward air bases' for refuelling and re-arming till the air power of the adversary is degraded. The operational mission includes air deterrence, air coercion, air offence, air blockade and close air support. PLAAF is also expected to assist in enforcing blockades by cutting off the adversary's external access, especially in South China Sea, which includes communication and transportation links.

In 2019, a private Chinese company, Ziyan UAV, demonstrated armed swarming drones.[70] In future, small drones with low observability characteristics, will cause significant damage to numerous dispersed high value targets. The AI progress is expected to bring significant effectiveness in surveillance, navigation and direct combat action.[71] By 2035, the transition will comprise of a combination of manned and unmanned elements operating in tandem in integrated battle spaces and, in the future, thereafter, majority of the platforms will be unmanned, with embedded AI systems. It is here that India needs to quickly develop or/and acquire stealthy unmanned aerial combat platforms and procure additionally mini/micro UAVs.

Operations at Tibetan Autonomous Region (TAR)

China has undertaken significant infrastructure upgradation at TAR. The '3+1' Lhasa project includes constructing a second runway at Gongkar airport, referred to as 'airborne bridgehead' into Tibet, in Lhuntse in the Lhoka area, second between Tingri and Lhatse, third at Purang, and another at Ngari Gunsa in Uttarakhand.[72] Development of 16 airfields in Tibet will facilitate rapid force mobilisation and render the natural Himalayan barrier ineffective.[73] The fighters deployed at Tier-1 airfields (Hoping, Gonggar, Hotan and Kashgar: JH-7, J-8, J-11 and J-16 fighters) vary between 80 to 100 and at Tier-2, between 150 to 170 aircraft.[74] In recent times, more and more J-20 aircraft are being deployed at TAR.

Figure 2: Chinese Airbases Around Ladakh



Source: bing.com[75]

Figure 3: PLAAF Airbases

Source: Atmanirbhar Soch

The modernisation drive and command & control structural changes have brought about a paradigm shift in the way integrated warfare will be conducted at TAR. Prior to the commencement of the conflict, there will be large scale cyber intrusions and attacks on our command and control centres, communication nodes, power generation hubs and nuclear infrastructure. Added to this is the large number of unmanned aerial vehicles or swarms that PLAAF is likely to use in 2035. The UCAVs will be used in combat operations, initially for suppression of air defence and targeting the centre of gravity targets by pre-emptively attacking command and control nodes, radars and AD elements, as also undertaking battlefield air support whilst providing continuous surveillance. The GJ-2 drones are currently being utilised at high altitude terrain. They are also likely to undertake high value time critical attacks on centre of gravity targets. This may result in providing a 'no win' tactical deterrence and work towards attaining air superiority[76] quickly, at a much lower potential cost.

PLAAF's limitations of high altitude operations reduced with the induction of fourth and fifth generation fighters, long range precision weapons, UCAVs and force multipliers. PLAAF is likely to embark upon an offensive campaign to seize air dominance quickly by utilising its Rocket Force' SSMs, fighters/fighter bombers and PLASSF assets. The UCAVs will be used to undertake battlefield air strikes as well as high value time critical attacks on centre of gravity targets whilst providing continuous surveillance. PLAAF could overfly Myanmar air space to strike Indian targets.

The key game changers for China are ASAT, BMD, Stealth, SSM, Cyber and DEW capabilities. However, response by PLAAF requires dominant asymmetry at different stages of the war zone campaign. This is where the

IAF could be a spoiler in PLA's time critical operations. Terrain friction due to peaks ranging between 4,300–5,400 metres imply that ground operations will traverse difficult terrain and require extensive logistics support. The supply chain in this terrain and logistics dumps could easily be interdicted from air. PLAAF will therefore focus on neutralising IAF's aerospace capability. The IAF will need to practise in decentralised conditions, if command, control and communication systems get degraded.

PLAAF has stocked battlefield missiles at Xinjiang and Aksai Chin for use against airfields, ALGs, logistics dumps and command and control centres. India needs to integrate AD elements belonging to the three services to form an integrated aerospace defence command. The stealth differential needs to be reduced quickly, which is compounded with China's significant SSM, BMD, Cyber, AI and DEW differential as well as unmanned armed capability. Otherwise, post 2035, any Sino-India conflict could prove perilous for India.

Way Forward for the Indian Air Force

China respects strength; the IAF, in line with the Indian Army, needs to follow an offensive-defensive strategy and denial doctrine more than defensive attrition-oriented strategy. Responsive capability needs to be built based on intimate integration between the three services. Strategic lines need to be identified with respect to not only the nuclear doctrine but also on Chinese deployments, wolf warrior actions and coercive creeping expansionist policies. In the East, we could even use the Yarlung Tsangpo river as a defining feature to determine the PLA's intent and plan our offensive-defensive strategy accordingly.

As far as the IAF is concerned, the MiG-21, AN-32 and MiG-29 aircrafts have been upgraded.[77] IAF has also upgraded 118 Jaguars with new engines, airframes, avionics, modern radars and weapon systems, which gives the fleet an additional 20 years of life.[78] It is also upgrading 40-50 Su-30MKIs (to carry the BrahMos missiles) and Mirage 2000H to Mirage 2000-5 Mk 2 variant. In addition, the IAF has acquired 36 fourth generation plus Rafale aircraft. Media reports indicate that the IAF is procuring eight TU-160 strategic bombers.[79] Considering our non-expansionist policies, instead of acquiring these expensive bombers, two squadrons of stealth fifth generation fighters such as F-35 could have been procured.

The indigenous development of Advanced Medium Combat Aircraft (AMCA), however, needs to be undertaken within defined timelines. There is an urgent requirement to have a fifth-generation fighter by 2027 to counter the increasing numbers of J-20 aircraft. The RFI to procure 114 medium

weight fighters was issued in April 2018[80] for a single engine non-stealth fighter and would be equivalent to LCA Mk IA. While the requirement is for a stealth fighter, the IAF is trying to procure an aircraft in fourth generation stage, thereby not progressing to the fifth generation at all. It is already procuring 83 LCA Mk-IA fighters between 2024 and 2029 in addition to the 40 Mk-1 LCAs procured earlier. Going for large number of only fourth generation fighters and relying on AMCA for stealth characteristics will put India in a significantly disadvantageous position by 2035 wrt PLAAF and PAF. Hence, it is essential to procure few squadrons of stealth fighters, preferably with transfer of technology whilst waiting for the operationalisation of the AMCA.

The decrease in IAF's fighter strength from 39 ½ to around 30 squadrons was offset by the Su-30 induction, but the IAF's retirement rate far outstrips its intake of new aircraft.[81] The IAF will be left with around 27–28 combat squadrons[82] by 2025-27, even with procurement of additional 21 Mig-29 and 12 Su-30 aircraft. India needs to acquire two more squadrons of Rafale quickly to tide over the short term. By 2035, Pakistan will have around 18 combat squadrons with significant number of fourth generation (mostly advanced JF-17s and J-10s) and some fifth generation fighter aircrafts. On the other hand, the author estimates that China will field more than 1,300 fourth/fifth generation fighters[83] that includes significant number of stealth aircraft. There is an urgent need to enhance the IAF's stealth potential by acquiring at least two F-35 equivalent fighter squadrons in the interim, on priority.

Furthermore, there is a shift taking place from manned to unmanned elements; to plug the combat potential degradation, six squadrons of UCAVs, preferably stealth, should be procured by 2025–27, and the current 90 Israeli Herons should be upgraded to UCAVs and beyond visual range operations. They should be supplemented with several mini/micro UAVs to create swarming conditions. This will cross the fifth generation hurdle without losing the combat edge whilst simultaneously developing indigenous AMCA. Realistically, keeping fund allocations in mind, 10–12 Su-30 MKI, four Rafale, two stealth/FGFA, two upgraded Mir-2000, six Mk-1A LCA,two upgraded Jaguar andone upgraded MiG-29 squadron could be made available in 2035. To supplement numbers, stealthy UCAVs may be a cost-effective option; six squadrons of UCAVs, each having 12 UCAVs need to be procured. Furthermore, all the UAVs/drones along with manned aircraft, should be maintained by the IAF to fight in integrated multi-domain battle spaces to make maintenance and operations cost effective.

Conclusion

China's Theatre Commands are likely to fight future wars. Military Region Air Forces (MRAFs) have now been renamed Theatre Command Air Forces (TCAF). PLA's structural changes indicate that there would be a much larger integration between their three services and between different arms of their services to fight future wars. PLAAF's strategy has shifted focus from territorial air defence to both defence and offence, and to build an air-space defence force that would meet the requirements of integrated multi-domain operations as well as intelligentised operations. There is also a shift from manned to unmanned elements and missions combining manned and unmanned platforms. Hence, there is a need to change Indian operational concepts to operate effectively in multi-domain integrated operational environment.

China is gradually building such integration that exploits rocket forces, cyber space and space based assets to paralyse the functioning of an adversary's command and control structures, information systems and his combat potential, thereby creating multi-domain dominance. This is of serious concern to the Indian Armed Forces who are grappling with inter-services integration. By 2035, China is likely to field modern fourth to fifth generation fighters, UCAVs, UAV swarms, modern missiles, cyber technologies and several AWACS aircraft. PLAAF will then possess abilities that will help it dominate the escalation matrix at each stage of conflict, which may include political signalling, to establishing no-fly zones and subsequently to initiate combat operations at a time and place of its choosing whilst having significant integration within their three services.

The IAF's optimum force structure for 2035 should progressively move towards a combination of fourth/fifth generation 30-32 fighter squadrons, additional five AWACS/AAR aircraft, appropriate heavy lift/METAC transporters, additional five upgraded S-400/S-500 AD (or equivalent indigenous PAD BMD) systems and adequate numbers of armed/attack and heavy lift helicopters whilst developing stealth capability. An ideal combination could include 10–12 Su-30 MKI, four Rafale, two stealth/ FGFA, two upgraded Mir-2000, six Mk-1A LCA, two upgraded Jaguar and one upgraded MiG-29 squadrons. To supplement numbers, force multipliers such as stealthy UCAVs would be a cost-effective option. Therefore, six squadrons of UCAVs, each having 12 UCAVs, need to be procured quickly, besides developing swarm capability with mini/micro UAVs. Several mini satellites would need to be kept ready for launch and counter space force needs to be made operational to ensure adequate offensive-defensive space deterrence.

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About the Paper

Till 1993, PLA was the key player in China's strategic thinking, with air, space and naval forces meant to support land forces. Subsequently, reprioritisation in 2004 allotted strategic roles to PLAAF and PLAN. In 2016, China created a flat command-and-control structure that enhanced CMC's authority. The PLAAF headquarters is now responsible for 'force accretion', manning, training and equipping of units, whilst the Theatre Commands (TC) are likely to fight all future wars. PLAAF has reduced the Military Region Air Forces (MRAFs) to five, and renamed them as Theatre Command Air Forces (TCAF).

PLA's structural changes indicate a much larger integration to fight future wars. PLAAF's strategy has shifted focus from territorial air defence to both defence and offence, and to build an air-space defence force that meets the requirements of integrated multi-domain operations as well as intelligentised operations. There is also a shift from manned to unmanned elements, and missions combining manned and unmanned platforms. Hence, there is a change in their operational concepts in multi-domain integrated operational environment. This is of serious concern to the Indian Armed Forces that are grappling with inter-services integration.

A need was felt to analyse what would be PLAAF's capability in 2035, and assess the efficacy of IAF's modernisation drive. This paper carries out detailed analyses of PLAAF's emerging capability and its operational doctrines to fight integrated multi-domain wars. It also tries to identify the deficiencies in our capability development programme and integration philosophy, and provides policy recommendations to ensure that IAF develops into a potent force by 2035, to fight integrated conflicts in a two-front scenario.

The Centre for Land Warfare Studies (CLAWS), New Delhi, is an independent Think Tank dealing with contemporary issues of national security and conceptual aspects of land warfare, including conventional & sub-conventional conflicts and terrorism. CLAWS conducts research that is futuristic in outlook and policy oriented in approach.

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