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“Aerospace power will always remain vital to the conduct of all military operations in the future of warfare.”¹

- Air Chief Marshal VR Chaudhari PVSM AVSM VM ADC

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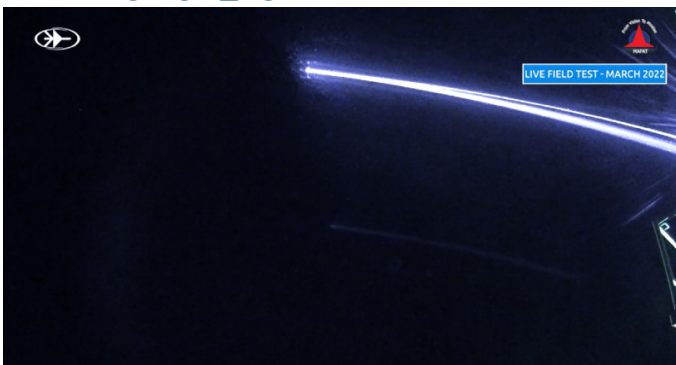
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Opinions and Analysis

Ukraine & Israel Wars: From Laser Weapons to Electronic Warfare, India Must Plug Holes to Defend itself from Iran-like Attacks

Air Marshal Anil Chopra (Retd) | 20 April 2024

Source: *Economics Times* | https://www.eurasianimes.com/ukraine-israel-wars-from-laser-weapons-to-electronic-warfare-india-must-plug-holes-to-defend-itself-from-iran-like-attacks/#google_vignette



Screengrab – Iron Beam

When Russia launched its ‘Special Military Operation’ against Ukraine in February 2022, the war was between the two largest nations of Europe. The Russian Air Force (RuAF) had around 1250, mostly 4th or 4.5-generation fighter aircraft, while the Ukrainian Air Force (UkAF) had around 100 fighters, giving Russia a 12:1 fighter aircraft superiority in numbers.

Russia had a similar or better advantage in strategic bombers, transport aircraft, AEW&C, Flight Refueling Aircraft (FRA), and attack helicopters, among other things. Russia also had the backing of a massive defense industry. With such overwhelming Russian superiority, Ukraine realized early that it would have to use innovative means to defend itself.

After Russia’s annexation of Crimea in 2014,

Ukraine was working closely with the West and had openly expressed a desire to join NATO. In February 2022, US-led NATO came in full support of Ukraine.

In addition to massive funds, the West gave Ukraine equipment to defend itself. These included anti-tank missiles and drones to stem Russian ground advances. Much more important was the Air Defence systems that would prevent RuAF from using Ukrainian skies with immunity. Far from Russia achieving air superiority, Ukraine created an environment that is now termed “Air Denial.”

Intelligence, Surveillance, Reconnaissance (ISR), direct attack munitions and unscrewed systems, secure communications, and air defenses have gained prominence in modernization militaries. One of the biggest lessons of the Ukraine war is that a smaller air force can, in many ways, blunt a larger force.

Russia was forced to use expensive stand-off precision-guided weapons and cruise missiles against targets that once could have been destroyed by much cheaper gravity iron bombs.

Russian Aerospace Force’s Offensive Capability

Russian Aerospace Force (VKS) has over 3,000 aircraft, of which nearly 1,200 are combat aircraft. These comprise nearly 60 each Tu-22M3 Backfire bombers and Tu-95MS Bear; 13 Tu-160 Blackjack; 86 MiG-29 Fulcrum; 88 MiG-31BM (multi-role); 24 MiG-31K (for Kinzhal Strike); 101 Su-27 Flanker; 100 Su-30 variants; 34 Su-34; 111 Su-35S; 68 Su-24M/M2 Fencer; 165 Su-25 Frogfoot; and 14 Su-57 Felon.

They had nearly 10 AEW&C, 60 aircraft for ISR (mostly Maritime), 15 Il-78 tankers, 17 EW aircraft (mostly ELINT), and 4 Presidential airborne command posts. Russia has around 340 attack helicopters (Ka-52, Mi-24, Mi-28, Mi-35).

Despite clear superiority over Ukraine, the numbers were not good enough to directly take on the expanded NATO.

VKS (Russian Air Force) has shown clear limitations and somewhat lackluster performance in the Ukraine conflict. It failed to gain air superiority, was unable to sufficiently degrade Ukrainian ground-based air defenses, could not carry out deep interdiction attacks against Ukrainian military targets, and was unable to provide adequate fire support to front-line ground forces.

They had not anticipated determined resistance from Ukrainian ground-based air defenses bolstered by Europe and the United States. They had anticipated an early conclusion of the invasion, but that was not to be.

The VKS lost nearly 20% of the initial strength of the Sukhoi Su-34 fighter ground-attack fleet, the highest attrition rate across all its aircraft types. The Su-25 ground-attack losses were also significant.

Russia also suffered heavy rotor-wing losses, particularly among Ka-52 Hokum attack helicopters. The VKS's underperformance in Ukraine has also illustrated its gap in special-mission aircraft. There is a dearth of ISR, electronic warfare, and jamming aircraft. Russia should have realized that SEAD (suppression of air defense) cannot be half-hearted.

The attrition among fighter aircraft caused

Russia to rely more heavily on long-range aviation that operated farther from Ukrainian air defenses and relied on land-attack cruise missiles.

The sporadic nature of the attacks reflected supply constraints of the long-range Raduga Kh-101 missile that replaced the Kh-25/Kh-27 and Russia's desire to conserve its precision-strike resources for a potential campaign against Ukrainian critical infrastructure. The VKS also employed some tactical weapons, including at least one variant of the Kh-38M and the Grom glide bomb.

The VKS also had to contend with leadership turmoil in 2023. Shortly after the group's rebellion in June, the Kremlin removed service chief General Sergei Surovikin, who was associated closely with Wagner chief Yevgeny Prigozhin. The Russian industrial complex had not anticipated a long war but managed to accelerate aircraft and weapon production. The focus is currently short-term.

Yet, Russia was forced to turn abroad to meet equipment needs. Iran is providing Moscow with UAVs and direct attack munitions. North Korea supplied up to 1,000 containers of equipment and munitions.

Ukrainian Air Defences

In 1992, the newly independent Ukraine took over control of the three AD corps stationed in Ukraine and retained the Air Defence Forces of Ukraine as a separate armed service, equal in status to the Ground Forces, Air Forces, and Navy.

Russia's invasion met with a level of US and European support for Kyiv that the Kremlin had not anticipated. Western governments

initially supplied Ukraine with large amounts of munitions and other military equipment from existing equipment inventories and exposed the relative shallowness of many NATO countries' munitions stocks. Air-defense equipment featured heavily in the transfers. The strong performance of these systems in Ukraine is likely to drive demand elsewhere.

Throughout 2023, Ukraine was able to put the Russian Black Sea Fleet on the back foot, strike key targets even in Russia, including some in the Moscow area, and limit Russian air-force operations to a stand-off role. Kyiv was unable, though, to succeed in its highly anticipated 2023 counter-offensive, which boasted modern Western equipment and troops that had received specialized training in the West.

Ukraine inherited a significant inventory of aircraft from the Soviet Union. According to Flight Global, 43 MiG-29s, 12 Su-24s, 17 Su-25s, and 26 Su-27s were in active service in 2021.

Since the 2022 Russian invasion, Ukraine has lost nearly 75 aircraft, including 50 fighters, mostly on the ground. Ukraine also had Soviet/Russian AD systems such as the S-300 (SA-11), the Buk (SA-10), S-125 Neva/Pechora, and 2K12 Kub, self-propelled, medium-range SAMs. They also have Strela and Igla Infrared homing Man-Portable Air Defence Systems (MANPADS).

Ukraine received significant AD systems from the West. As per Military Balance 2024, some of the major systems included 12 x IRIS-T SLM Medium-range SAMs, 8 x Skynex 35mm self-propelled air defense artillery, eight TRML-3D Air-surveillance Radars from Germany; 12 Batteries of NASAMS Medium-range AD system, and 14 x Vampire Point-defence

SAM funded by the USA; 100 x MR-2 Viktor 14.5mm self-propelled air defense artillery from Netherlands; Terrahawk Paladin 35mm self-propelled air defense artillery from the UK; Counter UAV systems from Australia; Belgium sent several Mistral launchers, AIM-120 for NASAMS, and 8 RIM-7 Sea Sparrow for SAM systems; Canada sent a battery of NASAMS and significant numbers of AIM-120 AMRAAMs, AIM-9s, AIM-7 beyond-visual-range missiles; Finland has sent AA guns; France sent one SAMP/T battery, two Crotale NG batteries, and a complete short-range air defense system; and Israel sent anti-drone systems. The list is unending.

Many NATO countries, such as Denmark, will be transferring F-16 aircraft in summer 2024. Ukraine also received over 2,000 US-made shoulder-fired Stinger missiles for MANPADS. A large number of AD instructors were sent from many countries. Bulgaria supported the repair of non-functional S-300 missiles in Ukraine. Ukraine has been pleading for Patriot air defense systems as Russia was destroying its power grid.

The bolstered Ukrainian air defenses were able to limit Russian combat-aircraft operations over the front line but struggled to keep pace with the barrage of cruise missiles, UAVs, direct-attack munitions, and high-speed weapons launched by Russia. Moscow, at times, had to reduce the pace of its attacks to restock but has been able to replenish.

Innovative Use Of Air Defense (AD) Systems

Kyiv continued to try to innovate weapons technology. After absorbing the invasion, Ukraine halted Russia's attempt to seize Kyiv by causing unacceptable losses to Russian air strike aircraft. Western space based ISR, secure

communications, command and control support (AEW&C), helped early warning and quick AD response. Western AD systems allowed full AD bubble cover, and the training of Ukrainians helped.

Ukraine camouflaged the AD systems well. It also followed “shoot and scoot” tactics to prevent exposing the location. Thus, Ukraine established what is called “Air Denial” over its territory, forcing Russia to use expensive stand-off weapons.

Though Russia used over a dozen hypersonic weapons, their military impact was questionable. Claims that American AD systems neutralized Kinzhal hypersonic missiles are being questioned. In the long term, MANPADS are not enough; LR-SAMs (long-range surface-to-air missiles) are required.

Ukraine did manage a better dispersal of assets after the initial months. UAVs/drones have democratized air power. Ukraine used the loitering munitions very effectively. In fact, the world is having a relook at CSFO (counter surface force operations) by crewed aircraft and would switch to loitering munitions.

Meanwhile, the counter-drone success rate has gone up to nearly 60%. But anti-drone systems to take on large saturating drone swarms and SSM (surface-to-surface missile) attacks will be needed.

Countries need to train for operations during denial of service. Innovation doctrinal changes are required. Information Technology as a decisive factor in war has been underscored. AI helped shorten the decision-making loop. Ukraine managed to create creative disruptions, including in the cyber domain.

Lessons from Israel’s Ongoing Conflicts

Israel has been fighting against Hamas and Houthis, both of which have no air force but significant drones and SSM (surface-to-surface missiles).

Hamas innovatively used “Motor Gliders.” Israeli intelligence failure was underscored. Neutralizing a rocket barrage has its own complexities. Success rates are often exaggerated. Cost vs. effect calculus needs to be calculated. The need for strong air defenses has come out very clearly.

Iranian planned attack had already been announced and anticipated. Western and local Arab Allies, like the United Arab Emirates, Jordan, and Saudi Arabia, had given sufficient intelligence and radar warning.

Israel was prepared and had active military backing of the US and many Western air forces already in the region. Nearly 325 projectiles, including 185 drones, 110 ballistic missiles, and 30 cruise missiles, were fired by Iran. Israel and its allies claim to have neutralized 99%.

Will India be able to defend a massive drone-cum-missile attack of the kind Iran made on Israel?

Can India Defend Such Attacks?

Ballistic missiles follow a high-altitude predictable trajectory and are detectable by radar. Drones fly at a very low altitude, like a slow-moving cruise missile, making them very difficult to detect. Drones are difficult to intercept until the drones have come uncomfortably close.

India has reasonably good radar coverage of the Swordfish radars, which are based on the Israeli Greenpine radar for ballistic missile

early warning. Radars, IR, and acoustic sensors for detecting drones and cruise missiles are still evolving.

Airborne Early Warning and Control systems (AEW&C) can detect these drones, but there is a limitation due to the limited number of these assets in the Indian Air Force (IAF) inventory and even fewer available for operations.

India's AD radars are well-networked, and a comprehensive air picture is available through the IAF's Integrated Air Command and Control System (IACCS).

Also, even after detection, to be able to take on a barrage of these weapons requires appropriate AD weapons. India has anti-air artillery (AAA), like Bofors 40 mm (L-70) and Zu-23-2 Shilka guns; shoulder-fired MANPADS like Igla-S, indigenous Akash missile system with range 30 km; SPYDER Python-5 (20 km), and Derby (50 km); Indo-Israeli Medium Range Surface to Air Missile (MRSAM) missiles (70 km), and LR-SAM (100 km).

Newer Akash variants can cover up to 80 km. QR-SAM with a 30 km range is under trial. The Indian military also has significant numbers of Russian 9K33 Osa, 2K22 Tunguska, and Pechora missile systems. More recently, India has acquired the S-400 systems that cover the AD bubble up to 400 km and an altitude of 30 km.

These are expensive and meant to take fighters and AEW&C class targets. The limited numbers do not allow them to be used against drones costing around \$10,000.

A small country like Israel has nearly 10 batteries of Iron Dome systems designed to take on small, fast-moving threats. Each battery costs

\$50 million, and each intercept costs close to \$150,000.

While individual missiles have a kill probability close to 98%, on a large raid, how many can be fired or intercepted is in question. The longer-range and even more costly Israeli "David Sling" AD system covers up to 250 km.

Undoubtedly, India needs many more AD systems and the capacity to build more missiles and also have surge production capability. But a much better option is to develop advanced Directed energy Weapons (DEW).

"Iron Beam" is an Israeli DEW (laser weapon). DEW is still evolving, and there are complexities related to atmospheric conditions and the ability to point at the target accurately. Yet typically, the cost of each interception is negligible—as little as \$2,000 per shot to cover all costs against \$150,000 per interceptor missile.

The Air Superiority 2030 – Lessons For India

What does Indian air power need to learn from the recent conflicts and projected future of air superiority? India will have to fight conventional military forces in a highly contested peer-capable environment. It will face integrated and networked air-to-air, surface-to-air, space, and cyberspace threats with advanced fighter aircraft, sensors, and weapons.

Future air wars will require Penetrating Counter Air (PCA) capability that can defeat agile intelligent platforms. There will be a need to counter hypersonic weapons, low observable cruise missiles, and sophisticated conventional ballistic missiles.

Future wars will require exploiting air and space together. Crewed-uncrewed teaming will

also be very advanced. Directed Energy Weapons (DEW) will dominate. Significant Cyber Force will be required, as will sophisticated electronic warfare capability.

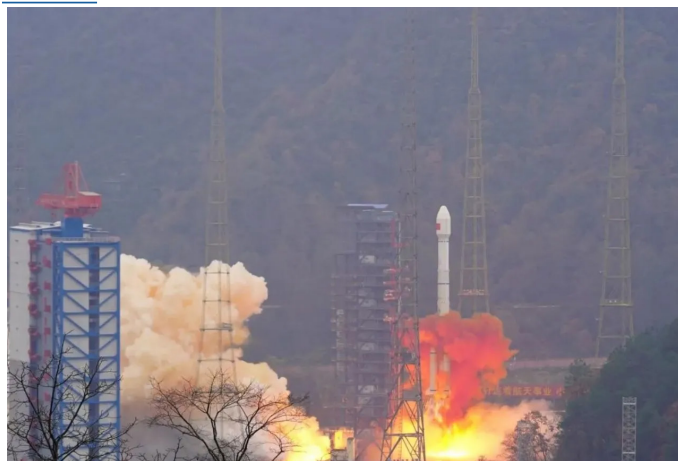
India will require many more fighter squadrons to match PLAAF's growing 5th-generation assets. Many more space-based ISR assets, AEW&C and FRA will be required.

Cruise missiles and munitions stocking will have to go up for possible long war. Large drone inventories will be required. Supply chain dynamics would have to be factored in. Most importantly AD systems will have to increase in numbers. There is a need to hasten indigenous programs and production and build future-proof industrial capability.

America is Losing its GPS Dominance to China's BeiDou Satnav

Sean Gorman | 08 April 2024

Source: Space News | <https://spacenews.com/america-losing-gps-dominance-china-beidou-satnav/>



A Long March 3B rocket with a YZ-1 upper stage lifts off from Xichang with the 57th and 58th BeiDou satellites on Dec. 26 (UTC), 2023. Credit: Ourspace

In the 20th century, the United States vied with the Soviet Union for space supremacy. Now, in the new century, America has a different rival — China — and a key battle is already brewing in the critical area of satellite navigation (satnav). Right now, the U.S. is falling behind.

While GPS was once the undisputed king of satnav (and a key instrument of American soft power), it now has a growing list of Global Navigation Satellite Systems (GNSS) competitors – from China's BeiDou to the European Union's Galileo, Russia's GLONASS and even India's regional system, NavIC.

Without question, the most significant rival comes from China, as the country is actively seeking to displace GPS as the world's dominant satnav system and, in so doing, to increase its own soft power influence on the nations that

use it. The National Space-Based Positioning, Navigation and Timing Advisory Board (PNTAB) warned that “GPS’s capabilities are now substantially inferior to those of China’s BeiDou” and urged the U.S. to regain PNT leadership over the next decade.

Why the U.S. is Falling Behind

While China and the EU have been investing heavily in their GNSS systems, the U.S. military is only making modest improvements to GPS.

The U.S. is currently replacing 1990s-era GPS satellites with newer GPS 3 satellites. However, GPS 3 is not a trailblazing technology. Originally intended to launch in 2014, these satellites offer only moderate improvements to GPS 2, such as an upgraded accuracy of 1 to 3 meters. This is less than what Galileo can provide. GPS 3 will eventually be followed by GPS 3F, which is expected to provide additional capabilities such as the first completely digital navigation payload. However, GPS 3F could take until the mid-2030s to be completed.

The military’s next-generation PNT system, known as NTS-3, is still only in the R&D phase, with the first test satellite to deploy no sooner than late this year. It is unclear how long it will take before NTS-3 is fully operational.

BeiDou’s advantages over GPS

With 56 satellites in orbit, China’s BeiDou is now nearly twice the size of GPS. It also has over ten times as many monitoring stations, many of which are in developing nations.

BeiDou’s larger size is a critical advantage over GPS. A Belfer Center report notes that BeiDou’s larger constellation offers greater PNT data availability and, in some cases, greater accuracy in many areas of the world. This is

especially the case in the developing countries in Africa and Southeast Asia which have been historically underserved by GPS. Nikkei Asia reported in 2020 that BeiDou “eclipses” GPS in 165 countries.

China also has ambitious plans to enhance BeiDou’s accuracy, security and reliability even further, in part by launching low-Earth orbit (LEO) constellations and by implementing new inertial sensors and future technologies like quantum navigation.

The Risks of Non-U.S. Satnav Supremacy

While the U.S. and Europe are pursuing a more cooperative approach to GNSS, China sees it as a zero-sum game tied to its larger geopolitical strategy.

As has been noted by multiple international affairs organizations, BeiDou is now a critical element of China’s Belt and Road Initiative, which aims to increase the country’s soft power influence, technological leadership and economic relationships across key regions to the detriment of its rivals.

From the U.S. standpoint, China’s so-called Space Silk Road, or space information corridor, poses significant risks. The primary concern is that in supplanting GPS’s position as the dominant global satnav service, BeiDou will erode America’s political and economic influence in key regions. Establishing GNSS dominance will consolidate China’s hold on global infrastructure, creating new and stronger dependencies on Chinese technologies, infrastructure, services and diplomacy in various regions. As BeiDou-integrated technologies become more embedded within a country’s infrastructure and economy, China’s influence will increase at the expense

of U.S. influence. In future diplomatic, trade or military disputes, these countries will be more vulnerable to intimidation. China could threaten to cut off access to this vital service, which could have a significant impact on a country's satnav capabilities, especially if it is not using multi-constellation infrastructure. The U.S. is already losing influence in key strategic regions like Africa where great power competition is increasing over such issues as rare earth minerals.

The U.S. is also concerned that China could use BeiDou as a platform for conducting espionage and other malicious activities inside these countries. While the satellite system itself is unlikely to be used this way, there is a potential risk with Chinese-made receivers and other equipment. A key part of China's BeiDou system is installing Chinese-supplied ground monitoring stations and Continuous Operating Reference Stations, especially in developing countries. According to the Belfer Center report, 11 sub-Saharan nations have already received China's reference stations, while another four countries (Saudi Arabia, Pakistan, Indonesia and Myanmar) have authorized installation. These ground-based systems and interconnected Chinese GNSS receivers could in theory contain backdoors and other malicious capabilities that could be used by China's government (or, to provide plausible deniability, its companies) to carry out espionage, surveillance, data theft, interference and cyber attacks.

America is facing a pivotal moment with the splintering of GNSS and the rise of China's GPS competitor. If BeiDou's progress is not matched by GPS or some other U.S. service, it will have a significant impact on American global soft power and the role of the U.S. in determining the standards and rulemaking for key emerging

technologies.

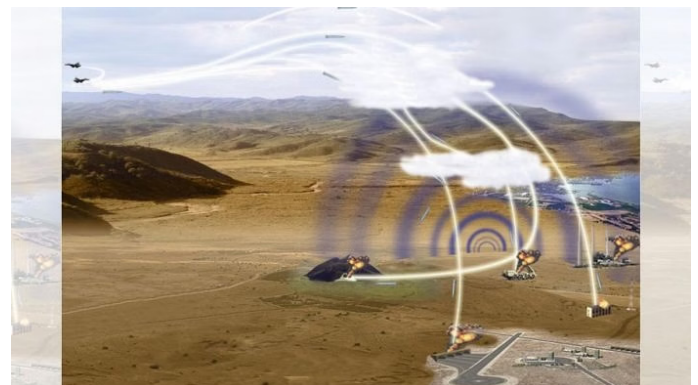
While the U.S. is making an effort to update GPS, it is already at a distinct disadvantage to BeiDou in terms of global PNT data availability, and soon it could fall behind BeiDou in overall accuracy, signal strength and security. While the U.S. does have a growing number of commercial partners with LEO communications satellites in orbit, which could become effective GPS alternatives, there are decided disadvantages to relying on for-profit instead of public GPS — the most important of which is cost. Unless the U.S. moves quickly to prioritize GPS innovation, the technological balance of power could shift toward China.

Air Power

What is 'ROCKS', India's First Air-Launched Quasi-Ballistic Missile

Snehesh Alex Philip | 25 April 2024

Source: The Print | <https://theprint.in/defence/what-is-rocks-indias-first-air-launched-quasi-ballistic-missile/2055734/>



Israeli defence major Rafael Advanced Defense Systems's missile ROCKS | Photo: www.rafael.co.il/

New Delhi: Last week, the Indian Air Force (IAF) quietly test fired a quasi-ballistic missile — ROCKS — from the Su-30 MKI, marking a significant increase in India's ability to target

deep inside enemy territory without even crossing its own air space.

Sources in the defence and security establishment confirmed that the test firing was successful.

The missile, a next generation extended stand-off air-to-surface missile, has been designed and manufactured by Israeli defence major Rafael Advanced Defense Systems keeping India's needs in mind.

It is learnt that the missile is a spin-off from the Sparrow series of air launched ballistic missile targets using capabilities of its Spice series of missiles.

With several components used in the missile being sourced from India, the IAF is looking at placing a larger order under the Atmanirbhar initiative, it is learnt.

The IAF wants the missiles to be manufactured in India.

Sources said the missile, which was incidentally showcased to the world for the first time at the 2019 Aero India in Bengaluru, is a quasi-ballistic missile and has a range of less than 300 km.

Quasi ballistic means that the missile does not fire and perform like a regular air-to-ground weapon system. The pilot of the aircraft can choose the trajectory of the missile to be horizontal or even vertical. It is designed to strike high-value stationary and relocatable targets above ground, or underground, and heavily fortified targets with pinpoint accuracy in GPS-denied arenas.

It can be equipped with either a penetration or blast fragmentation warhead.

Due to the ballistic nature of its flight, its high velocity during the terminal stages of flight would greatly help it penetrate deeper into a target.

Sources said that because of the stand-off capabilities, the missile can also take out modern enemy air defence systems.

Incidentally, the missile was used by the Israeli military to target a S-300 battery of the Iran last week.

Operating autonomously, and launched at an extended stand-off range well outside the areas of heavily-defended surface-to-air threats, ROCKS incorporates technologies inherited from the legacy Popeye and SPICE air-to-surface weapons.

Rafael explains that the pilot allocates a mission for the missile before its release, including target type, coordinates, impact angle and azimuth, topographic imagery data, and fuse delays. The missile is guided to the target by a GPS navigation system, using a homing device and scene matching technology of the target for the final few metres to ensure a precise hit.

An advanced electro-optical (EO) seeker, together with the anti-radiation homing, enables day, night and all-weather operation.

Automatic target acquisition, using a unique scene-matching algorithm and anti-radiation technology, overcomes any GPS jamming scenario, as well as navigation and target location errors, Rafael says.

It adds that the missile can also hit moving targets.

With this, the Su 30 MKIs will have two major missiles on board, the other being the air-

to-surface version of the BrahMos supersonic cruise missile.

The IAF already uses several Israeli missiles, including the Spice 2000 used in the Balakot air strike. Another missile, Crystal Maze, was to be fired, too, but could not due to a technical challenge.

DRDO Successfully Test Fires Indigenous Technology Cruise Missile from Chandipur off Odisha Coast

Deepak Upadhyay | 18 April 2024

Source: [Live Mint](https://www.livemint.com/news/india/drdo-indigenous-technology-cruise-missile-chandipur-ictm-defence-ministry-rajnath-singh-subsonic-cruise-missile-11713437575244.html) | <https://www.livemint.com/news/india/drdo-indigenous-technology-cruise-missile-chandipur-ictm-defence-ministry-rajnath-singh-subsonic-cruise-missile-11713437575244.html>



ITCM: During the test, all subsystems performed as per expectation, DRDO said

The Defence Research and Development Organisation (DRDO) on Thursday successfully conducted a test flight of an Indigenous Technology Cruise Missile (ITCM) from the Integrated Test Range (ITR), Chandipur off the coast of Odisha.

During the test, all subsystems performed as per expectation. The missile performance was monitored by several Range Sensors like Radar, Electro-Optical Tracking System (EOTS) and

Telemetry deployed by ITR at different locations to ensure complete coverage of the flight path., the news agency ANI reported.

The flight of the missile was also monitored by IAF Su-30-Mk-I aircraft.

“The missile followed the desired path using waypoint navigation and demonstrated very low altitude sea-skimming flight,” the Defence Ministry said in a release.

This successful flight test has also established the reliable performance of the indigenous propulsion system developed by Gas Turbine Research Establishment (GTRE), Bengaluru”, the release added.

Congratulating the DRDO for the successful flight-test of the ITCM, Defence Minister Rajnath Singh said, "The successful development of indigenous long-range subsonic cruise missile powered by indigenous propulsion is a major milestone for Indian defence R&D."

Secretary Department of Defence R&D and DRDO Chairman Dr Samir V Kamat congratulated the entire DRDO team on successful conduct of the ITCM launch.

The ITCM missile is also equipped with advanced avionics and software to ensure better and more reliable performance.

The missile is developed by Bengaluru-based DRDO laboratory Aeronautical Development Establishment (ADE) along with contributions from other laboratories and Indian industries.

Earlier on April 14, the Indian Army successfully carried out field trials of indigenously-developed man-portable anti-tank guided missile (MPATGM) weapon system, paving the way for its induction into the force's

armoury.

The weapon system has been designed and developed by the Defence Research and Development Organisation (DRDO), the officials said.

The overall system consisted of the MPATGM, launchers, target acquisition device and a fire control unit.

The weapon system is well-equipped for operation in both day and night.

India: Prepares for ‘One Airspace’: Unified Air Traffic Control Plans Set in Motion - What it Means

06 April 2024

Source: Times of India | <https://timesofindia.indiatimes.com/business/india-business/india-prepares-for-one-airspace-unified-air-traffic-control-plans-set-in-motion-what-it-means/articleshow/109084063.cms>



This strategic move is expected to optimize air traffic management, benefiting airlines.

India to soon have ‘One Airspace’: India is moving forward with a plan to streamline its airspace management to enhance efficiency and reduce emissions. The initiative aims to consolidate control over the airspace spanning 2.8 million square nautical miles, currently divided into four regions, under a unified

command center in Nagpur. The aim is to ‘unify’ the airspace.

Officials told ET that this strategic move is expected to optimize air traffic management, benefiting airlines through cost savings and improved safety measures.

The Airports Authority of India (AAI) has initiated the process by inviting bids from consultants to obtain technology from global companies and implement advanced technology solutions for a single air traffic management system.

The comprehensive program, projected to span over eight years, includes infrastructure development, controller training, and migration to the new system. Once fully operational, the unified airspace strategy will enable airlines to identify more efficient flight routes, resulting in reduced travel time and fuel consumption. By facilitating consistent flight patterns at higher altitudes and smoother descents for landing, the initiative aims to enhance operational efficiency.

Senior air traffic control officials emphasized the current challenges of coordinating flights across different regions and the anticipated simplification with the centralized control in Nagpur. “Currently, when an aircraft passes over the Indian region, the controllers have to hand it over to the other region, which includes a lot of coordination especially over busier air routes,” an official was quoted assaying. “Once a single unified sky is achieved, almost 75-80% of controllers will be based in Nagpur, reducing the need for coordination, leading to less stress and fatigue. Single coordination also allows restructuring of air routes, opening up more fuel-efficient routes for airlines,” the official said.

This shift is expected to significantly reduce coordination efforts, alleviate stress, and enhance operational fluidity for pilots as well. Pilots welcomed the initiative, noting that it would streamline communication processes and reduce cockpit workload. The unified airspace management system will provide pilots with advance information on altitude and routing, enabling smoother transitions across regions and minimizing the need for frequent radio frequency changes.

“You get to know your altitude, routing well in advance and if you are flying above 25,000 feet, you can overfly with complete radio silence without seeking multiple clearances and reducing communication with the ATC (air traffic control),” a senior commander was quoted as saying.

The decision to enhance airspace efficiency aligns with the growing demand for air travel in India, as seen by the substantial increase in aircraft orders by domestic carriers. Civil aviation minister Jyotiraditya Scindia has in the past highlighted the significant growth in the Indian aviation sector, with projections indicating a doubling of the current aircraft fleet in the next five years.

Indian Army Boosts Air Defence Capabilities with 'Akashteer Control and Reporting Systems'

04 April 2024

Source: Economics Times | https://economictimes.indiatimes.com/news/defence/indian-army-boosts-air-defence-capabilities-with-akashteer-control-and-reporting-systems/articleshow/109041467.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst



Indian Army boosts air defence capabilities with 'Akashteer Control and Reporting Systems'

In a significant move towards enhancing India's defence capabilities and technology absorption, the induction of 'Akashteer Command and Control Systems' has commenced in the Indian Army's Corps of Army Air Defence.

The deployment of Akashteer begins with the flagging off of the first batch of Control Centres from BEL Ghaziabad on April 4, 2024.

According to defence officials, the project developed by Bharat Electronics Limited (BEL) as part of the Atmanirbhar Bharat initiative is poised to significantly enhance the operational efficiency and integration of the Army's air defence mechanisms. The Akashteer Project is a cutting-edge initiative designed to automate

Air Defence Control and Reporting processes by digitising the entire process.

It is highlighted that the Indian Army has declared the year 2024 as the 'Year of Tech Absorption' and undertaking various initiatives to induct niche technology and systems in its inventory. The induction of Akashteer Control Centres is one of the major milestones achieved by the Indian Army on its Path to Transformation that will meet the current and futuristic requirements of complex air defence operations.

"By integrating radar and communication systems at all levels into a unified network, Akashteer aims to deliver an unprecedented level of situational awareness and control. This will enable swift engagement of hostile targets, significantly reduce the risk of fratricide, and ensure the safety of friendly aircraft in contested airspace," defence officials said.

As per the officials, a noteworthy aspect of Akashteer is its emphasis on mobility and resilience. The system's Control Centres, designed to be vehiclebased and mobile, can maintain operational capabilities even in challenging communication environments.

The system will facilitate the achievement of complete automation of air defence operations and significantly enhance the air defence posture of India.

30 IAF Bases to get 5-Layer Security System

Ajay Banerjee | 10 April 2024

Source: Tribune India | <https://www.tribuneindia.com/news/india/30-iaf-bases-to-get-5-layer-security-system-609524>



Bids have been invited from Indian companies for the Integrated Perimeter Security System by June 24. File

With an aim to ensure five layers of sensor, alarm and perimeter surveillance, 30 Indian Air Force (IAF) bases across the country are set to get a state-of-the-art security system.

The Ministry of Defence (MoD) has invited bids from Indian companies for the Integrated Perimeter Security System (IPSS) by June 24.

The system must be capable of providing surveillance in all weather and ambient light conditions throughout the year at both day and night.

The IPSS will consist of five layers of sensors for intrusion detection — an electrical smart power fence; a CCTV with an infra-red camera and inbuilt video analytics and automatic intrusion detection capabilities; a radar; underground vibration detection system connected with a dedicated optical fibre cable; and thermal cameras that can pick up things at night.

The layers of sensors are to be integrated

by artificial intelligence-enabled software and automation. Water bodies such as drains, canals and culverts passing through the perimeter shall be protected using electro-optical sensors.

The MoD is looking at having “gap free coverage” throughout the perimeter of each air base. The move has been necessitated after the Pathankot air base attack in January 2016. A high-level committee led by Lt Gen Philip Campose (retd), a former Vice Chief of Army Staff, suggested several emergency measures, which were carried out.

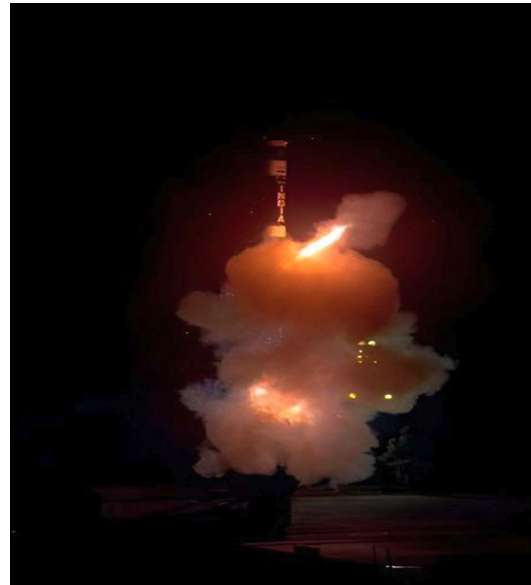
The electric fence will deter intruders by a non-lethal high voltage low shock and sound an alarm at the control room when someone attacks, tries to climb through or tampers with the fence.

The infra-red cameras, with an inbuilt motion detector, will be used for surveillance at night. Also, the MoD is looking to set up radars along the perimeter of the 30 IAF bases to ensure gap free coverage. The underground vibration-detection system will be able to spot anyone walking, crawling and tunnelling across the perimeter.

New Generation Ballistic Missile Agni-Prime Successfully Flight-Tested

04 April 2024

Source: The Hindu | <https://www.thehindu.com/news/national/new-generation-ballistic-missile-agni-prime-successfully-flight-tested/article68027482.ece>



New generation ballistic missile Agni-Prime was successfully flight-tested by Strategic Forces Command & DRDO off the Odisha coast on April 3, 2024. Photo: X/@DRDO_India

The new generation ballistic missile Agni-Prime was successfully flight-tested by the Strategic Forces Command (SFC) along with the Defence Research and Development Organisation (DRDO) from the Dr APJ Abdul Kalam Island off the coast of Odisha around 7pm on Wednesday.

“The test met all the trial objectives validating its reliable performance, as confirmed from the data captured by a number of range sensors deployed at different locations, including two downrange ships placed at the terminal point,” a Defence Ministry statement said. The launch was witnessed by the Chief of Defence Staff, Chief of SFC and senior officials from DRDO and the Army.

Agni-P is a two-stage canisterised solid propellant ballistic missile with dual redundant navigation and guidance system, according to DRDO. It has a range of 1,000-2,000km and was tested for the first time in June 2021. It is lighter than all the earlier Agni series of missiles.

In June 2023, the first pre-induction night launch was conducted by the users after three successful developmental trials of the missile, validating the accuracy and reliability of the system.

Agni series of missiles constitute the backbone of India's nuclear weapons delivery which also includes the Prithvi short range ballistic missiles and fighter aircraft. India has completed its nuclear triad and operationalised its second strike capability with nuclear-powered ballistic missile submarine INS Arihant undertaking deterrence patrols.

→ Agni-Prime is a two-stage canisterised solid propellant ballistic missile with dual redundant navigation and guidance system, according to DRDO.

→ It has a range of 1,000-2,000km and was tested for the first time in June 2021.

→ It is lighter than all the earlier Agni series of missiles.

Space

PLA SSF Scrapped, it's now the PLA ISF: What does it Mean?

Suyash Desai | 21 April 2024

Source: [Economics Times | https://economictimes.indiatimes.com/news/defence/pla-ssf-scrapped-its-now-the-pla-isf-what-does-it-mean/articleshow/109476958.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst](https://economictimes.indiatimes.com/news/defence/pla-ssf-scrapped-its-now-the-pla-isf-what-does-it-mean/articleshow/109476958.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst)



The Space Force's Geosynchronous Space Situational Awareness Program satellites, depicted here, serve a neighborhood watch function. (U.S. Air Force)

The People's Republic of China's (PRC) Central Military Commission (CMC), the apex military bureaucracy, held the founding meeting of the new Information Support Force (ISF) on April 19, 2024. The Chinese Communist Party General Secretary and Chairman of the CMC, Xi Jinping, awarded the military flag to the ISF. It was later announced that the People's Liberation Army Strategic Support Force (PLA SSF) would cease to exist.

Formed on December 31, 2015, the PLA SSF centralised space, cyber, electronic and psychological warfare capabilities into a single service. It was formed to create synergies between

various advanced warfighting capabilities and was hailed as instrumental in achieving Xi's stated goals of modernisation, informatisation, and converting the PLA into a world-class army. With this change, the PLA now has a new system with four services - the Army, Navy, Air Force and Rocket Force, and four arms - the Aerospace Force, Cyberspace Force, Information Support Force and Joint Logistic Support Force.

What is Information Support Force?

The Information Support Force (信息支援部队), as clarified by the PLA spokesperson Wu Qian, is a new PLA arm along with the Aerospace Force, the Cyberspace Force and the Joint Logistic Support Force. Earlier, the PLA space, cyber and network capabilities were clubbed together into the PLA SSF. Furthermore, the PLA Joint Logistics Support Force (JLSF) was an additional independent force that provided strategic logistics support to all five theatre commands. But now, the PLA SSF is broken down into three arms alongside the JLSF. Early reports indicate that the ISF will be responsible for the PLA communications networks and network defence.

The PLA's Information Communications Base (ICB) earlier held this responsibility under the PLA SSF. The ICBs were mandated to provide information support and enable communication for the entire army. The formation of these bases highlights the importance of network support and network defence for moving towards "multi-domain integrated joint operations" and "joint operations under the conditions of intelligentisation" – CMC's 2019 stated goals.

What was the previous structure?

The 2019 PRC national defence white paper described the PLASSF as 'a new type of combat

force for safeguarding national security and an important driver for the growth of new combat capabilities.' With the integration of the Space Systems Department (航天系统部) and the Network Systems Department (网络系统部), the PLA SSF was mandated to consolidate the Chinese military's space systems capabilities and oversee cyber, electronic, and psychological warfare capabilities to enable strategic deterrence and create strategic offensive in the newer domains of warfare.

Furthermore, as Kania and Costello's research highlights, the SSF was also mandated to provide certain supporting functions like battlefield environment protection, information and communications assurance, information security protection, as well as new technology testing. Put simply, in the past, the PLA SSF merged the second and third departments of the General Staff Department; now it is separated.

How will this change impact these operations?

The preliminary reports indicate that the space operations would be delegated to the Aerospace force, the cyber and electronic, psychological warfare operations would be delegated to the cyberspace force, and the battlefield environment protection, information and communication assurance, and information security protection would be with the ISF. The JLSF would continue with its logistic support and strategic delivery responsibilities.

Why this change now?

There could be multiple permutations and combinations for this change. Corruption has always been a significant problem for the PLA and one of the stated reasons for Xi's 2015 Chinese military reforms. Additionally, the PLA Rocket Force (PLA RF) and PLA SSF were mired

in complex corruption charges in 2023, resulting in the disappearance of its leadership. But it will be a bit of a stretch to claim that only corruption led to this reorganisation.

As former US Deputy National Intelligence Officer Mark Parker Young highlights, the PLA has struggled for many years on certain critical functions like cyber operations, intelligence support, and overseeing the development of C4ISR architectures.

However, since the Gulf War of 1991, the PLA has been aware of the learnings and application of newer military technologies from other wars. With the use of advanced tech and the increased importance of quick reaction time in the ongoing Russian-Ukraine War and the Israel-Palestine conflict, the Chinese military leadership could have rethought the importance of decentralisation of forces for rapid, flexible responses.

Finally, there are also questions regarding the PLA SSF's tangible deliverables in the past eight years. However, these are extremely difficult to measure but could be due to multiple factors like the lack of specialised recruitments, bureaucratic inertia, corruption or incompetence resulting to this shake-up.

Who are the new ISF commanders?

Lt Gen Bi Yi is appointed as the Commander of the ISF and Gen Li Wei is appointed as a Political Commissar. Bi was previously the Deputy Commander of the PLA SSF and has also served as the Deputy Minister of the Training Management Department of the Central Military Commission. Li was the Political Commissar of the South Xinjiang Military Region, Xinjiang Military Region and also the PLA SSF.

How will it Impact the PLA's Combat Readiness?

There are two ways of analysing the PLA's combat readiness and implications for regional security. If corruption and incompetence were the drivers of this reorganisation, then it could be said that the PLA is still far away from actual combat readiness. These newly formed arms would have to take a life of their own to be combat-ready.

Furthermore, with the surfacing of multiple corruption allegations in 2023, the morale of the forces, especially the PLA Rocket Force, would be low.

On the other hand, the parallel establishment of these four arms is a significant step towards integrated joint operations. The fact that the commanders of these forces can now directly report to the CMC, instead of having to go through the SSF commander, is a positive development. This change not only streamlines the reporting process but also indicates progress towards achieving intelligentisation and integration.

India Aims to Achieve Debris-Free Space Missions by 2030

16 April 2024

[Source: Teh Hindu | https://www.thehindu.com/sci-tech/science/india-aims-to-achieve-debris-free-space-missions-by-2030/article68071003.ece](https://www.thehindu.com/sci-tech/science/india-aims-to-achieve-debris-free-space-missions-by-2030/article68071003.ece)



Indian Space Research Organisation (ISRO) Chairman S. Somanath made the declaration at the 42nd Inter-Agency Space Debris Coordination Committee (IADC) annual meet in Bengaluru on April 16, 2024. | Photo Credit: File photo

India has made a declaration to achieve debris-free space missions by 2030.

Indian Space Research Organisation (ISRO) Chairman S. Somanath made the declaration on April 16, at the 42nd Inter-Agency Space Debris Coordination Committee (IADC) annual meet.

“This initiative aims to achieve debris-free space missions by all Indian space actors, governmental and non-governmental, by 2030. India encourages all state space actors to follow this initiative for long-term sustainability of outer space.

“It is one of the intent or initiative of India to ensure that debris-free space missions are conducted so as to ensure the sustainability of space. I would like to make this initiative a declaration today, this can be discussed and debated in the coming days,” Mr. Somanath said.

ISRO has a very clearly laid out plan as far as space exploration and space utilisation is concerned.

“Currently, we have 54 spacecraft in orbit. Plus, there are non-functional objects. But, we have been taking very careful action wherever possible to dispose of or remove the space objects once its active role is over to de-orbit, and bring it to a safe location. We want to make sure that for all the spacecraft we are likely to launch in the future, we will be taking action to make sure that we de-orbit and bring it to a safe location,” Mr Somanath added.

With India planning to set up its own space station ‘Bharatiya Antariksha Station’ by 2035, ISRO would like to look at the agreements of all the space stations and space actors, including private ones.

“We would like to look at the agreements on all the space stations and all space actors, including private space actors, to comply with the guidelines of how to make sure that the space is sustainable and make sure we don’t propagate activities so as to create more debris so that human beings continue exploration of space in the coming days,” Mr. Somanath said.

→ India has made a declaration to achieve debris-free space missions by 2030. Indian Space Research Organisation (ISRO) Chairman S. Somanath made the declaration on April 16, at the 42nd Inter-Agency Space Debris Coordination Committee (IADC) annual meet.

→ ISRO has a very clearly laid out plan as far as space exploration and space utilisation is concerned.

→ With India planning to set up its own space

station 'Bharatiya Antariksha Station' by 2035, ISRO would like to look at the agreements of all the space stations and space actors, including private ones.

Reusable Rocket Engine Completes Major Test in China

Simon Mansfield | 16 April 2024

Source: [Space Daily](https://www.spacedaily.com/reports/Reusable_rocket_engine_completes_major_test_in_China_999.html) | https://www.spacedaily.com/reports/Reusable_rocket_engine_completes_major_test_in_China_999.html



In a significant advance for China's space capabilities, a new reusable rocket engine has passed a critical test, marking a key milestone in the country's efforts to develop reusable launch vehicles.

The engine underwent a dual-ignition test last Friday at a testing facility in Fengxian County, Shaanxi Province, which confirmed its performance and functionality, as stated by the Academy of Aerospace Propulsion Technology, a major producer of liquid-propellant engines in China, located in Xi'an.

This testing process included 30 ignitions across 15 tests, achieving over 3,900 seconds of burn time. This engine, a project of the China

Aerospace Science and Technology Corp., employs liquid oxygen and kerosene and boasts a thrust capacity of 130 metric tons, featuring a variable thrust system.

The engine is designated for use in future reusable rocket designs currently under development at the corporation.

Gao Xinhui, a senior researcher at the Xi'an-based academy and the project lead, commented on the engine's advancements over existing models in terms of power and efficiency, and noted reductions in weight and size. Gao highlighted that the recent tests were also geared towards validating the engine's quick maintenance post-use to enhance reliability and determine its service limits.

Continued tests will assess the engine's reusability and performance consistency, Gao added.

As reusable rockets gain traction globally, spurred by successes like SpaceX's Falcon Heavy, China Aerospace Science and Technology Corp is also exploring this technology, with plans to introduce two rocket models with varying diameters in the next two years, as revealed by Wang Wei, a senior executive at the company last March.

White House Directs NASA to Develop Lunar Time Standard

Jeff Foust | 02 April 2023

[Source: Space News | https://spacenews.com/white-house-directs-nasa-to-develop-lunar-time-standard/](https://spacenews.com/white-house-directs-nasa-to-develop-lunar-time-standard/)



NASA has been studying an architecture called LunaNet for lunar communications and navigation that could require a new time standard. Credit: NASA

WASHINGTON — A new White House policy instructs NASA to develop a strategy for a new time standard for use on cislunar missions to provide improved navigation and related services on and around the moon.

The Policy on Celestial Time Standardization in Support of the National Cislunar Science and Technology Strategy, released by the White House’s Office of Science and Technology Policy April 2, directs NASA to develop a strategy by the end of 2026 to create Coordinated Lunar Time (LTC), a new time standard based on Coordinated Universal Time (UTC) on Earth but adapted to operations on the moon.

“As NASA, private companies and space agencies around the world launch missions to the Moon, Mars and beyond, it’s important that we establish celestial time standards for safety and accuracy,” Steve Welby, OSTP deputy director for national security, said in a statement.

Simply using UTC in cislunar space is inadequate for precision operations, the policy notes. UTC is tied to Earth-based systems, but relativistic effects mean a second on the moon is not the same length as one on Earth. “For example, to an observer on the Moon, an Earth-based clock will appear to lose on average 58.7 microseconds per Earth-day with additional periodic variations,” the policy states.

While that difference is imperceptible for most applications — it would take nearly 50 years to build up a one-second offset — it is a problem for navigation and related applications, like space situational awareness and proximity operations, where higher precision is required.

“A consistent definition of time among operators in space is critical to successful space situational awareness capabilities, navigation and communications, all of which are foundational to enable interoperability across the U.S. government and with international partners,” Welby said.

The policy sets four major features for LTC: traceability to UTC, accuracy sufficient for precision navigation and science, resilience to loss of contact with Earth and scalability to environments beyond cislunar space.

The policy provides little technical guidance for establishing a lunar time standard but suggests it may be done like terrestrial time standards, which use a network of atomic clocks. “Just as Terrestrial Time is set through an ensemble of atomic clocks on Earth, an ensemble of clocks on the Moon might set Lunar Time,” it states.

Besides providing a finalized strategy for a lunar time standard to the White House by

the end of 2026, the policy directs NASA to also include the topic in its annual cycle of reviews of its Moon to Mars Architecture, which it unveiled nearly a year ago and updated earlier this year. NASA will work with several other agencies, including the Departments of Commerce, Defense, State and Transportation, on the lunar time strategy.

NASA has been working on a concept called LunaNet to provide communications and navigation services at the moon using an interoperable network that could include commercial and international contributions. NASA and the European Space Agency have produced several versions of a LunaNet Interoperability Specification that mentions the creation of a Lunar Time System Standard, although documentation for that has not been developed.

In May 2023, the National Geospatial-Intelligence Agency (NGA) announced it was working with NASA to develop a positioning and navigation system for the moon. The goal, NGA officials said then, was to create a system for users on the moon that works “as accurately and as safely as GPS does on Earth.” That announcement did not go into details about creating a lunar time standard.

Russia Vetoes UN Resolution Against Nuclear Weapons in Space

Brett Tingley | 27 April 2024

Source: [Space](https://www.space.com/russia-nuclear-weapons-space-veto-un-resolution) | <https://www.space.com/russia-nuclear-weapons-space-veto-un-resolution>



Ambassador Vassily Nebenzia of Russia attends a UN Security Council meeting on April 2, 2024. (Image credit: Lev Radin/Pacific Press/LightRocket via Getty Images)

Russia vetoed a United Nations resolution that was aimed at preventing a nuclear arms race in space.

The resolution was sponsored by the United States and Japan and called upon all nations to never deploy nuclear weapons in outer space. The resolution comes on the heels of recent reports that Russia is developing a nuclear anti-satellite weapon of some kind. The furor caused by the reports led the White House to issue a statement that the rumored weapon poses "no immediate threat to anyone's safety."

Thirteen nations, including the United States, voted in favor of the resolution. Russia was the only vote against, while China abstained, meaning it did not vote one way or the other. Russia's ambassador to the U.N., Vassily Nebenzia, called the resolution a "dirty spectacle" and a "cynical ploy," according to the Associated Press.

After Russia's move to block the resolution,

the U.S. ambassador to the U.N., Linda Thomas-Greenfield, questioned why Russia would veto such a proposal.

"Today's veto begs the question: Why? Why, if you are following the rules, would you not support a resolution that reaffirms them? What could you possibly be hiding?" Thomas-Greenfield asked after the vote.

However, despite vetoing and abstaining from approving the resolution, respectively, Russia and China actually proposed an amendment to the resolution that calls upon all nations to "prevent for all time the placement of weapons in outer space, and the threat of use of force in outer space." Seven countries voted in favor of the amendment, seven voted against, and one abstained.

The United States was one of the countries that voted against the amendment.

Nebenzia then levied his own questions at the U.S. "We want a ban on the placement of weapons of any kind in outer space, not just WMDs [weapons of mass destruction]," the Russian ambassador said. "But you don't want that. And let me ask you that very same question: Why?"

It could be that while the United States wants to prevent a nuclear arms race in space, American military leadership is fine with other types of weaponry in space, particularly when it comes to anti-satellite capabilities.

In September 2023, the U.S. military's Defense Advanced Research Projects Agency (DARPA) asked private companies to help it find new solutions to achieve "space superiority," meaning ways to project U.S. military power in space. The U.S. Space Force also recently

activated a unit tasked solely with targeting adversary satellites and has conducted "simulated on-orbit combat engagements" during training exercises.

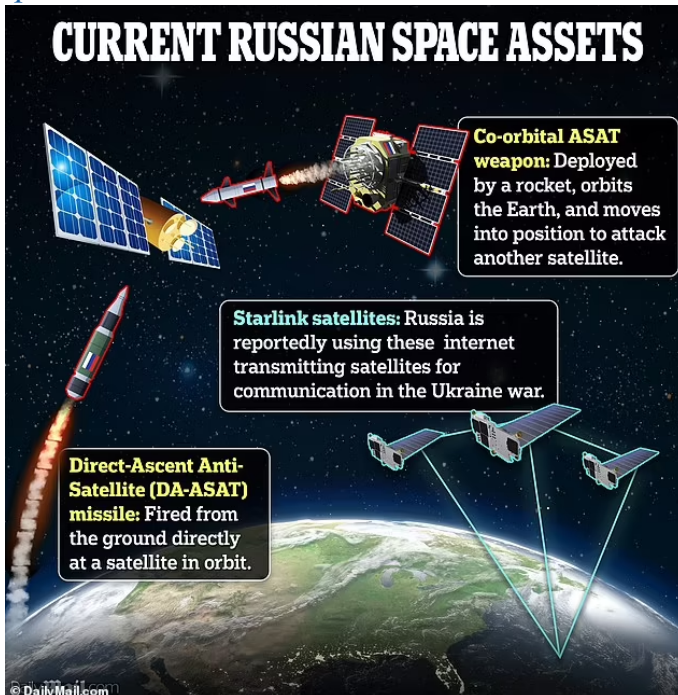
Russia has likewise been testing some eyebrow-raising capabilities in recent years. In August 2022, the Russian satellite Cosmos 2543 deployed another object into orbit. In a statement, the U.S. Space Force called the move evidence of "Russia's continuing efforts to develop and test space-based systems, and consistent with the Kremlin's published military doctrine to employ weapons that hold U.S. and allied space assets at risk."

Russia has even made threats against Western commercial satellites, calling them a "legitimate target" for military attacks.

US Military Tests New Weapon to Prepare for 'Space-Enabled' Attacks on the US - as Russia and China Lead the Star Wars Nuke Race

04 March 2024

[Source: Daily Mail | https://www.dailymail.co.uk/sciencetech/article-13350807/military-weapon-space-attacks.html](https://www.dailymail.co.uk/sciencetech/article-13350807/military-weapon-space-attacks.html)



Russia already has several space-based military assets. These include co-orbital anti-satellite (ASAT) weapons, direct-ascent ASAT missiles, and Starlink communication satellites it is contracting for its war on Ukraine

The US Space Force conducted the first test of a ground-based warfare system to protect military forces against 'space-enabled' attacks - as Russia and China aim to put nukes in space.

The device, which looks like a satellite dish, was designed to jam orbiting satellite communication by overloading the airwaves with competing signals.

Known as the Remote Modular Terminal (RMT), the device is touted as being low-cost and remotely operated, 'keeping Guardians out

of harm's way.'

Space Force announced the test this week, noting it is the first time the system has been fielded at two geographically separated locations and controlled from a third, emphasizing its operational flexibility.

The weapon comes as Russia voted down a United Nations resolution calling on all nations to prevent a dangerous nuclear arms race in outer space and China abstained from voting.

U.S. Space Force Lt. Col. Gerrit Dalman said: 'This event demonstrates the Service's new vision for integrated developmental and operational test to provide more relevant capabilities to Guardians faster.

'Specifically, this capability will unlock the scale to provide counterspace electronic warfare capability to all of the new Space Force components globally.'

If an enemy satellite were targeting US troops or facilities on the ground, one or more RMTs would emit signals in a certain range of the electromagnetic spectrum to confuse and distort the signals being sent to or from the satellite.

Simply put, the airwaves would be too clogged with nonsense for enemies' satellites to make anything out.

The end goal is rendering those satellites useless - whether they have actual weapons on them or are just providing surveillance data to enable other types of attacks.

Not much information is available on the RMTs, but in a slide from a Space Force presentation to industry figures in October 2023, the military group described the weapon as 'small transportable systems that can be emplaced in

both garrison and austere environments,' meaning the Space Force could deploy them anywhere, whether or not there is somewhere to plug them in.

The device itself looks like a satellite dish, around 10 feet in diameter.

Space Force received its first four units from the manufacturer in September 2023.

Most recently, STARCOM officials announced that: 'The recent test is the first time the system has been fielded at two geographically separated locations and controlled from a third, emphasizing its operational flexibility.'

The test also included a Cyber Vulnerability Penetration Assessment 'to ensure the remote connections were secure.'

STARCOM's announcement comes on the heels of multiple signals that US military and political rivals are gearing up to put military equipment into space.

In February, House Intel Chair Rep. Mike Turner of Ohio said members of Congress had been made aware of a 'serious national security threat' but would not go into details.

It later emerged that it was related to Moscow's plan to put a nuclear weapon into space to target and destroy satellites the world depends on.

And back in December, China successfully launched a top secret, unmanned spacecraft one day after a classified US Space Force craft was supposed to go into orbit.

The US mission was grounded due to technical issues, but China's went off without a hitch.

'It's probably no coincidence that they're trying to match us in timing and sequence of this,'

General Chance Saltzman, Space Force's Chief of Space Operations, said at the time.

China used one of its well-known Long March 2 rockets to put the secret spacecraft into orbit, but the public still does not have any images of this craft, dubbed the Chinese reusable experimental spacecraft, or CSSHQ.

If - or when - Russia deploys nuclear weapons into orbit around Earth, such a weapon could threaten satellites that enable military and civilian communications for the US and other western allies.

While nuclear bombs are usually thought of as weapons meant to cause large numbers of casualties and mass property destruction, in space the strategy appears to be the creation of an electromagnetic pulse (EMP).

When a nuclear bomb goes off, whether on land or in space, it creates an EMP.

This burst of electromagnetic energy can disable or destroy electronic equipment - including satellites.

If a Russian orbiting weapon attacked US satellites, it could effectively cripple the US, causing nationwide blackouts and shutting down communications.

Cell phone towers, internet, GPS, banking systems, power grids, first responders and military operations could all be impacted.

In this climate, the Space Force's leadership has stressed how important it is for the service to roll out new weapons - both in space and on the ground.

The Space Force credited the RMT's quick development to a partnership with an unnamed

'small business,' which started working on the devices just 38 days after the military branch had received its proposal.

At the Space Foundation's annual Space Symposium earlier this month, Saltzman said in a speech that it's crucial for the US's newest military branch to work in close partnership with commercial industry.

'The Space Force must harness the benefits of technological innovation and emerging capabilities if we're going to be able to out-compete our competitors, or Space Force will lose, the Joint Force will lose and the U.S. will lose,' he said.

'Throughout our nation's history,' said Saltzman, 'military success has hinged on support from commercial industry.'

Global Aerospace Industry

India Delivers First Batch of BrahMos to Philippines

Dinakar Peri | 19 April 2024

Source: The Hindu | <https://www.thehindu.com/news/national/india-delivers-first-batch-of-brahmos-to-philippines/article68084161.ece>



The batch was transported on an Indian Air Force aircraft that landed in Philippines on Friday afternoon | Photo Credit: Special Arrangement

India delivered the first batch of BrahMos supersonic cruise missiles to Philippines on Friday. In January 2022, Philippines concluded a \$375-million deal with India for three batteries of shore-based, anti-ship variant of the BrahMos becoming the first export customer for the joint venture missile between India and Russia.

The first batch was delivered onboard transport aircraft of the Indian Air Force which landed in Philippines on Friday afternoon. Specifics of the delivery made were not immediately available. Philippines is acquiring the systems under the Horizon 2 of the Revised Armed Forces of the Philippines Modernization Programme.

The delivery comes amid the showdown between Philippines and China in the South China Sea which has been ongoing for the last few months and will significantly augment the defensive posture of the Philippines armed forces

once the systems are operationalised.

During his visit to Philippines in March, External Affairs Minister S. Jaishankar in a meeting with the Secretary of National Defence of Philippines Gilberto C. Teodoro, Jr. reaffirmed India's commitment to upholding a rules-based international order and promoting peace and security in the Indo-Pacific region. "During the high-level meeting, Secretary Teodoro welcomed India's unwavering support for the Philippines' position on the West Philippine Sea/South China Sea issue," the Philippines Ministry of the armed forces said in a statement.

In January 2022, then Philippines Defence Secretary Delfin N. Lorenzana, who signed the contract, had said, "As the world's fastest supersonic cruise missiles, the BrahMos missiles will provide deterrence against any attempt to undermine our sovereignty and sovereign rights, especially in the West Philippine Sea."

The contract includes the delivery of three missile batteries, training for operators and maintainers as well as the necessary Integrated Logistics Support package. The coastal defence regiment of the Philippine Marines will be the primary user of the missile systems.

From January 23 to February 11, 2023, 21 Philippine Navy personnel were trained in the operations and maintenance of the systems in Nagpur and were awarded interim missile badges by Indian Navy Chief Admiral R. Hari Kumar after they completed the operator training.

As reported earlier, several countries have expressed interest in acquiring BrahMos systems and discussions are in advanced stages with Indonesia and Thailand among others.

BrahMos is a joint venture between DRDO

and Russia's NPO Mashinostroyeniya and the missile derives its name from Brahmaputra and Moskva rivers. The missile is capable of being launched from land, sea, sub-sea and air against surface and sea-based targets and has been long inducted by the Indian armed forces.

The range of the missile was originally capped at 290km as per obligations of the Missile Technology Control Regime. Following India's entry into the club in June 2016, the range has been extended to 450km and work is on to extend it to 600km and beyond.

KAI Leads Korean Aerospace into top 4 with AI Innovation

Park Sung-woo & Park Su-hyeon | 23 April 2024

Source: Chosun | <https://www.chosun.com/english/industry-en/2024/04/23/H4BO7DWLJFFBLJ5Z4REVDW4D2M/>

Korea Aerospace Industries (KAI), having achieved success in developing its own aircraft, is now advancing its second phase of growth by embracing Fourth Industrial Revolution technologies. In February, KAI announced a 102.5 billion won investment in core technologies for the next-generation air combat system. This investment aims to secure advanced technologies such as artificial intelligence (AI), big data, autonomy, and unmanned systems, essential for the envisioned "6th generation battlefield system."

This battlefield system, led by AI, represents a sophisticated network where various battlefield assets, including manned and unmanned aircraft, are seamlessly interconnected. Notably, the United States leads the Next Generation Air Dominance (NGAD) program, while the Global

Combat Air Programme (GCAP) is pursued by the United Kingdom, Italy, and Japan.

At this year's World Defense Show (WDS) and Drone Show Korea, KAI unveiled the Next Generation Aerial Combat System (NACS) based on the KF-21 platform. This system integrates manned fighters, unmanned fighters, and multipurpose drones, leveraging microsatellites and geostationary satellites for enhanced capabilities. KAI is also actively developing AI pilots, a pivotal technology for integrated manned and unmanned combat systems. Additionally, KAI has embarked on research and development endeavors for an "AI-based simulated flight training system" for the Air Force and is concurrently developing AI virtual aircraft for future Air Force pilot training.

KAI is extending its AI technology across all business domains. For instance, plans are underway to apply AI to aircraft production processes for quality defect identification, design optimization, and predictive maintenance. By integrating AI into design, production, testing, evaluation, and support phases, KAI anticipates cost reductions and accelerated development timelines.

Currently, KAI boasts a portfolio of diverse aircraft platforms, encompassing fixed-wing and rotary-wing categories, showcasing world-class technology and testing expertise. Last year, KAI embarked on research into AI pilot technologies, focusing on the most challenging aircraft control aspects, and is now gearing up for flight validation using a scaled-down model of an independently developed multipurpose drone.

Identifying the next-generation air combat

system and space mobility business as its future cornerstones, KAI announced its 'Global KAI 2050 Vision' last year. The Advanced Air Vehicle (AAV) represents a synthesis of KAI's expertise in fixed-wing, rotary-wing, and unmanned aircraft development, coupled with Fourth Industrial Revolution technologies. Additionally, through the space mobility business, KAI aims to drive down launch costs for defense satellites, contributing to the burgeoning space economy.

A KAI official emphasized, "Internally, there's been discussion about KAI's mission being 'K-AI,' highlighting our technological leadership in the aerospace sector." They further declared, "We are committed to positioning Korea among the world's top four aerospace industries, spearheading future advancements, and designating this year as the inauguration of future businesses."

China's Kuaizhou Commercial Rockets Aim for 8-10 Launches to Deploy 30 Satellites into Orbits in 2024

Deng Xiaoci | 23 April 2024

Source: *Global Times* | <https://www.globaltimes.cn/page/202404/1311100.shtml>



Photo: Courtesy of Hubei Sanjiang Group, CASIC

Amidst China's commercial Kuaizhou rockets aim to carry out eight to 10 orbital launches in 2024, to deploy more than 30 satellites into their designated orbits, *Global Times* has learned from Hubei Sanjiang Group, a wholly-owned subsidiary of the country's space contractor China Aerospace Science and Industry Corporation (CASIC) and developers of the rockets, on Tuesday.

In an interview on Tuesday, the firm revealed that currently it has commissioned the Kuaizhou-1A and Kuaizhou-11, two types of commercial rockets for the launch missions.

The Kuaizhou rockets have been constantly moving forward on the path of independent innovation. It is currently the solid carrier rocket with the highest number of launches and consecutive successful launches in China. Its reputation as the "gold-medal rocket" is becoming increasingly prominent in the industry, developers said.

The Kuaizhou-1A rocket has completed 26

launches to date, delivering 56 satellites into their designated orbits to date. These satellites include various types such as remote sensing, navigation enhancement, communication, scientific experiments, and more, while the Kuaizhou-11 carried out its maiden flight on December 7, 2022.

The Kuaizhou-1A carrier rocket has the highest number of launches among Chinese rockets and leading network efficiency, according to the developers.

In 2019, it set a record of consecutive launches within six hours at the Taiyuan Satellite Launch Center. From the end of 2023 to the beginning of 2024, four Kuaizhou-1A rockets from the same batch achieved "four launches and four successes" within 18 days.

Thanks to the precise launch of the Kuaizhou rockets, remote sensing satellites can capture high-precision images of Earth from space and conduct meteorological detection. Navigation enhancement satellites enhance the service capabilities of satellite navigation systems in orbit. Communication satellites provide narrowband Internet of Things (IoT) and broadband Internet services. Scientific experiment satellites carry out frontier scientific explorations such as microgravity experiments and new technology verifications in orbit.

These efforts provide integrated solutions for resource integration in the air, space, and on the ground, benefiting various fields such as national land and resource monitoring, mineral resource development, smart city construction, forestry resource survey, ecological environment monitoring, public health emergency response, transportation, and energy and power.

In the latest example to illustrate the high efficiency of the commercial rocket model,

from March 22, 2023, to January 5, 2024, the Kuaizhou-1A rockets were launched continuously in groups in a "5 launches, 20 satellites" format, assisting in the basic completion of the Tianmu-1 sun-synchronous orbit constellation within 360 days.

This achievement set the record for the fastest network formation of domestic commercial satellite constellations, according to the rocket developers.

Moreover, In November 2023, the 70-ton reusable liquid oxygen methane engine independently developed by the Kuaizhou rocket research team successfully completed a 200-second full-system long-range hot test.

Shortly thereafter, the Kuaizhou team embarked on another journey, and the engine type successfully completed multiple startups, thrust variations, and rated condition hot test assessments, validating multiple technical indicators.

In January 2024, the Kuaizhou reusable technology test rocket successfully completed vertical takeoff and vertical landing (VTVL) tests, achieving a new breakthrough.

The Kuaizhou Rocket Industrial Park was established in Wuhan National Aerospace Industry Base in the capital city of Central China's Hubei Province, officially starting production.

The industrial park has solid and liquid carrier rocket core test capabilities and an annual assembly and testing capacity of 20 to 50 carrier rockets.

The development drives more and more companies to join the aerospace launch supply chain system, promotes mission coordination, attracting many upstream and downstream

enterprises in the aerospace industry chain to settle in the Wuhan National Aerospace Industry Base, the Sanjiang Group revealed.

China to Leverage Growing Commercial Space Sector to Launch Megaconstellations

Andrew Jones | 19 April 2024

Source: Space News | <https://spacenews.com/china-to-leverage-growing-commercial-space-sector-to-launch-megaconstellations/>



Landspace's Zhuque-3 VTVL-1 test article during a first hop test, Jan. 19, 2024. Credit: Landspace

HELSINKI — China will utilize expected launch capacity from the country's emergent commercial space sector to help realize its megaconstellation plans.

The move will help traditional state-owned players focus on civil and military programs, including human spaceflight, military and lunar plans, while also boosting China's overall launch and space capabilities and meeting national strategic goals.

China has outlined plans for two separate low Earth orbit communications megaconstellations in response to projects including SpaceX's Starlink and OneWeb. These are the national Guowang project, or SatNet, consisting of around 13,000

satellites, and the Shanghai-backed G60 Starlink initiative, which raised 6.7 billion yuan (\$943 million) early this year. More than a hundred are planned for launch this year, but thousands will need to be in place in the coming years in order to secure use of frequencies.

It now appears that new launch capacity being developed by commercial actors will play a pivotal role in getting the planned satellites into orbit, according to a report from China Central Television (CCTV).

The report notes that China needs to act fast before low Earth orbit is saturated by other actors in terms of spacecraft in orbit and frequencies claimed and used. Noting the dominance achieved by SpaceX and its reusable rockets over the past decade, this approach is seen as meeting new demands requiring China to expand its launch capacity, while still meeting needs for existing national civil, military, science and deep space missions.

Company	Rocket Name	Rocket Type	Key Features or Notes
iSpace	Hyperbola-3	Methane-liquid oxygen reusable	Payload capacity of 8,500 kg to Low Earth Orbit (LEO); first flight planned for 2025.
LandSpace	Zhuque-3	Methalox reusable	Payload capacity up to 21,000 kg to LEO; first flight planned for 2025.
Galactic Energy	Pallas-1	Kerosene-liquid oxygen reusable	Payload capacity of 5,000 kg to LEO, or 3,000 kg to a 700 km sun-synchronous orbit (SSO).
CAS Space	Kinetica 2	Kerolox reusable	Payload capacity of 7,800 kg to 500 km SSO.
Deep Blue Aerospace	Nebula-1	Kerolox reusable	Payload capacity of 1,000 kg to 500 km SSO; first flight planned in late 2024.
Space Pioneer	Tianlong-3	Kerolox	Comparable to Falcon 9 in launch capability; plans for a reusable first stage.
Orienspace	Gravity-2	Kerolox	25,600 kg to LEO. First flight in 2025; plans for a reusable first stage.
CASC	Various	Various	Working on reusable rockets including a new-generation human-rated launcher, spaceplane, and Long March 9 super heavy-lift launcher.

Non-exhaustive list of planned Chinese reusable rockets (Credit: Andrew Jones/SpaceNews).

Officials have previously stated contracts for satellite internet megaconstellations—part of a wider, national “new infrastructures” policy—will be open to commercial players.

China’s commercial launch companies began emerging around 2015 following a central government decision to open up sections of the space sector to private capital. While early launch efforts focused on smaller, simpler solid rockets, the sector is maturing. China’s first commercially-developed liquid propellant rockets reaching orbit in 2023 and many players are now developing large, reusable launchers, are now close to providing added launch capabilities

Landpace, with the methane-liquid oxygen Zhuque-2 and planned stainless steel Zhuque-3, Space Pioneer with the kerosene-fueled Tianlong-3, Galactic Energy (Pallas-1) and iSpace (Hyperbola series) are among companies working on reusable rockets. Meanwhile Deep Blue Aerospace could make its first orbital launch and recovery attempt later this year with the Nebula-1 rocket.

Further bolstering this trend is the fact that commercial space is now also receiving strong promotion by China’s central and local governments.

China’s Central Economic Work Conference, held in December in Beijing, identified the commercial space industry as one of several strategic emerging industries to nurture. Commercial space was also noted as a priority in a government work report in March.

Municipal and provincial governments, including Beijing, Shanghai, Shandong, Hainan and Anhui have recently introduced policies to attract and foster commercial space companies.

These actions are seen as potential drivers of high-tech growth and innovation, with the commercial space sector perceived as having the ability to stimulate the growth of related industries, including materials science, computer technologies and artificial intelligence.

China’s Rapid Launch Rate Growth

China’s national annual launch rate has grown from a national record 22 in 2016, to 55 in 2022 and 67 in 2023. This meant China was behind only the United States in terms of launches and payload to orbit, with SpaceX accounting for the vast majority of launches.

This year, China aims for around 100 launches, including around 30 planned by commercial actors. Only a handful of launches from the above activity have so far been related to China’s megaconstellation plans.

But getting the two megaconstellations off the ground includes meeting deadlines set by the International Telecommunication Union (ITU), which coordinates the use of frequencies. For Guowang, China will need to launch the first satellites using all the frequencies to be brought into use by 2027, and launch 10% of the total number of satellites launched by September 2029. Half of the satellites for the constellation will need to be launched by September 2032. Deployment of the constellation is to be completed two years later.

Meeting the targets for both Guowang and G60 Starlink will require further growth of China’s launch activities, meaning both relying on commercial launch providers, but also providing opportunities for these companies to establish themselves.

The next few years will be crucial in this area,

a Landspace official told CCTV: “For domestic commercial rocket companies, the next 5 to 10 years are a very important period of strategic development opportunities. We must work hard. Seizing such a window period will also help our country seize the right to speak in the future of space and space.”

Spaceport Access Bottleneck

While China has greatly increased its small satellite manufacturing capacity and launch capabilities, it faces a bottleneck in access to spaceports for launch, particularly for commercial actors playing second fiddle to civil and military missions.

Two new launch pads, dedicated to the Long March 8 rocket, for which new engine production capacity has been built, and a range of commercial launch service providers, are close to completion near Wenchang spaceport on Hainan island.

In a new development, the national Jiuquan Satellite Launch Center in the Gobi Desert is planning a commercial space launch demonstration area, according to CCTV. Companies including Landspace and Space Pioneer have already established their own launch facilities in the area.

Sea launches are another, emerging option, while another spaceport may be constructed near Ningbo in Eastern China.

International Context and Competition

China’s plans and progress have raised concerns among other nations, in terms of capabilities, leadership and international competition. China’s own military has meanwhile claimed that SpaceX has intended for Starlink to be used for military purposes in the wake of Ukraine’s defense against the invasion of Russia. At the same time, China plans two such constellations.

Furthermore, Chinese commercial launch companies that prove themselves through launching internet satellite missions could eventually position themselves as alternatives on the international launch market, while the megaconstellations themselves could be part of a wider, geopolitical struggle for influence and position China as a provider of global infrastructure.

Low Earth orbit is not the only area in which some Chinese officials see the United States as competing with and trying to force out China. Former chairman of China’s state-owned main space contractor, Wu Yansheng, said in late 2022 that he believes the U.S. is seeking to seize strategic resources including specific orbits, locations and radio frequencies.

In March 2023 another space official called for the country to speed up its plans to develop lunar infrastructure or miss out on a never-to-be-repeated opportunity. China launched its Queqiao-2 lunar relay satellite and a pair of small experimental lunar communications and navigation satellites in March.

Indian Aerospace Industry

India Proffers HAL its Largest-Ever Tender: 97 Tejas Fighters

Gordon Arthur | 19 April 2024

Source: *Defence News* | https://www.defensenews.com/global/asia-pacific/2024/04/19/india-proffers-hal-its-largest-ever-tender-97-tejas-fighters/?utm_source=sailthru&utm_medium=email&utm_campaign=c4-overmatch



An Indian Air Force Tejas rolls inverted during its aerial display at the 2022 Singapore Airshow. (Mike Yeo/Staff)

CHRISTCHURCH, New Zealand — Indian state-owned aerospace company Hindustan Aeronautics Limited (HAL) has received a request for proposal from the Ministry of Defence for 97 light fighters, setting up the largest-ever order for the aircraft.

The company's Tejas fighters – also known as Light Combat Aircraft, or LCA – are critical to the Indian Air Force, as the service currently has only 31 fighter squadrons compared to a mandated level of 42.

A HAL spokesperson confirmed that the company had received the solicitation but couldn't say when a response with a concrete pricing proposal would be delivered. The Indian

Air Force did not respond to a question about the expected price tag for the contract, but published estimates peg the cost at somewhere north of INR650 billion, or roughly \$7.8 billion.

This 97-fighter tender request follows the Defence Acquisition Council's formal acceptance of the military requirement for the aircraft on Nov. 30, 2023.

HAL already has two Tejas production lines in Bangalore, each of which can produce eight aircraft annually. A third production line at Nashik, Maharashtra, is due to open in October, adding another eight planes to the annual output.

That means the company could be in a position to manufacture 24 LCAs annually by 2025 or 2026.

The new tender sets up HAL's second contract for the aircraft, after a \$6.5 billion deal in January 2021 for 73 single-seat and 10 twin-seat trainer aircraft. The first production LCA Mk1A, the latest configuration, completed its maiden flight on March 28. HAL was supposed to deliver the first copy in February, a deadline that the company missed.

The new order will give the Air Force 180 Mk1A fighters across nine squadrons, in addition to 40 older LCA Mk1 aircraft.

HAL noted four main advances in the newer Tejas version: an advanced electronic warfare suite with self-protection jammer, active electronically scanned array radar, improvements to ease maintenance, and the ability to fire beyond-visual-range missiles.

Once concluded, the deal will greatly boost HAL's order books, which as of March 31

exceeded \$11.2 billion. Earlier this month, the company announced record revenues of more than \$3.6 billion for the financial year that just ended, an increase of 11% over the previous year.

Indian Air Force Receives First Indigenously Designed Crash Fire Tender

03 April 2024

Source: Business Standard | https://www.business-standard.com/amp/external-affairs-defence-security/news/indian-air-force-receives-first-indigenously-designed-crash-fire-tender-124040300604_1.html



Photo credit: Photo posted on Twitter by @IAF_MCC

The Indian Air Force (IAF) on Wednesday said it had recently received the delivery of the first indigenously designed and developed Crash Fire Tender (CFT).

"The IAF recently took the delivery of the first among many, indigenously designed and developed Crash Fire Tender. Manufactured by a Noida-based Indian MSME firm, against a contract worth Rs 291 Cr, the Indian manufacturer ensured the delivery of the CFT within 14 months of contract signing," posted the Air Force on its social media handle X.

"This was achieved in spite of multiple

disruptions in the global supply chain. As envisaged and promised, the IAF continues to handhold the Indian Defence Manufacturing and Production entities," read the post.

The Indian Air Force is promoting indigenisation and has procured many made-in-India items to meet its operational requirements.

Promoting Make in India in Defence sector has been one of the key focus areas of the Narendra Modi government and multiple steps have been taken in this direction.

The Indian Air Force has also placed orders for a large number of indigenous fighter aircraft including the light combat aircraft Tejas and is working with Defence Research and Development Organisation (DRDO) to develop the latest fifth-generation advanced medium combat aircraft for meeting its future requirements.

Earlier on March 28, the first Aircraft LA5033 of the Tejas Mk1A Aircraft series took to the skies from HAL facility in Bengaluru. It was a successful sortie with a flying time of 18 minutes.

HAL Explores Global Partnerships to Replace IAF's Aging Transport Fleet

31 March 2024

Source: *India Defence* | <https://defence.in/threads/hal-explores-global-partnerships-to-replace-iafs-aging-transport-fleet.4992/>



The proposed CoE signifies a monumental stride in the strategic partnership between CSIO and HAL.

Thinkstock

India's aerospace giant, Hindustan Aeronautics Limited (HAL), is taking strategic steps to boost the nation's defence capabilities.

The state-owned company is addressing the Indian Air Force's (IAF) critical need for Medium Transport Aircraft (MTA), aiming to replace its aging fleet of Soviet-era An-32 and IL-76 aircraft.

HAL's approach involves both developing its own offering and partnering with established international aerospace companies.

The IAF's Pressing Need

The IAF is modernizing its fleet and has thoroughly studied its requirements for the MTA program. Statements from the IAF chief highlight the urgent need to replace the older transport aircraft by mid-2035.

In response to the IAF's Request for Information (RFI), global aerospace leaders

have expressed interest, signaling the project's significance.

Lockheed Martin proposes the proven C-130J Hercules, while Embraer offers its C-390M. Airbus has thrown its hat in the ring with the A400M.

Importantly, all contenders are ready to set up local production facilities in India, partnering with private sector companies. This commitment reinforces the focus on indigenous manufacturing within India's defence sector.

HAL's Multi-Pronged Strategy

HAL's ambition adds a compelling dimension to the MTA competition. Although partnerships in military transport aircraft development are less common, HAL is actively looking for international collaborations.

One possibility is exploring ties with a Korean manufacturer for their MC-X tactical transport program, which boasts a 30,000kg payload capacity.

Interestingly, HAL might also consider renewing its relationship with Russia and its Ilyushin Il-276 program. Though India withdrew a decade ago over engine selection issues, geopolitical realignments could make this an option again.

HAL's forward-thinking approach extends to potentially partnering with Japan. The Kawasaki C-2 is a noteworthy possibility due to its mid-size design, twin-turbofan engines, long-range capabilities, and impressive payload capacity exceeding 40,000kg.

The Road Ahead

HAL's willingness to explore diverse partnerships reflects its determination to secure

the best possible MTA solution for the IAF.

The company's strategic moves, combined with the interest of international heavyweights, promise a dynamic and potentially transformative outcome for India's military transport capabilities.

Indian MOD Hands Over Components for Tejas Mk1A Fighter Jet

John Hill | 23 April 2024

[Source: Air Force Technology | https://www.airforce-technology.com/news/indian-mod-hands-over-components-for-tejas-mk1a-fighter-jet/](https://www.airforce-technology.com/news/indian-mod-hands-over-components-for-tejas-mk1a-fighter-jet/)



The Tejas fighter jet, showcased at Aero India Air Show, 13 February 2023. Credit: Shutterstock/Aerospace trek.

India's Defence Research and Development Organisation (DRDO), a branch within the Ministry of Defence (MOD), has handed over indigenously built components to an industrial supplier, Hindustan Aeronautics Limited (HAL), to be fitted onto the next Tejas fighter iteration, the Mark 1A (Mk1A).

Building on the Indian Air Force's original Tejas fighter jet, which entered service in 2016, the Mk1A will cost \$4.5bn over the next ten years, according to GlobalData. The DRDO has widened the indigenous supply chain, having sourced various components across India's fledgling defence industry.

As part of these efforts, the DRDO has handed over the first batch of cutting-edge actuators and an airbrake control module to HAL for the LCA Tejas Mk1A.

Tejas is a single-seat, single-engine, lightweight, high-agility supersonic fighter aircraft. It has a delta design with shoulder-mounted delta wings. It has a fin but no horizontal tail. Lightweight materials, including aluminium, lithium and titanium alloys, and carbon composites, have been used in the construction.

There is also a naval variant, which completed a flight test aboard the Indian Navy's aircraft carrier, INS Vikramaditya in 2020.

Driven by the need to address critical deficiencies in the Tejas Mk1 aircraft variant, India was compelled to develop a new upgrade specification for the baseline light combat aircraft (LCA). Mk1A is said to incorporate more than 40 improvements over the original Mk1 version, which entered service in 2016.

With HAL as the prime contractor, India placed the order for the acquisition of 83 LCA Mk1A aircraft in February 2021, with the first units of the aircraft expected 36 months after the signing of the contract. The deliveries of aircraft are expected to commence sometime in 2024 and will be delivered at the rate of 16 aircraft annually.

The secondary flight control of LCA-Tejas, comprising leading edge slats and airbrakes, now has servo-valve-based electro-hydraulic servo actuators and control modules. These high-pressure, redundant servo actuators and control module, characterised by astute design, precision manufacturing, assembly, and testing, represent a culmination of the DRDO's pursuit

of indigenous technological prowess.

The production of these components is underway at the Accessories Division of HAL in Lucknow, marking a significant stride toward strengthening India's aerospace manufacturing capabilities.

Noteworthy contributions from public and private industries, including Godrej Aerospace, Mumbai, alongside certification agencies such as CEMILAC and DGAQA, have been instrumental in this endeavour.

HAL, NAL Sign Tech Transfer Pact for Tejas Engine Bay Door Production

Vijay Mohan | 28 February 2024

[Source: PTI News | https://www.ptinews.com/story/national/hal-nal-sign-tech-transfer-pact-for-tejas-engine-bay-door-production/1446750](https://www.ptinews.com/story/national/hal-nal-sign-tech-transfer-pact-for-tejas-engine-bay-door-production/1446750)

Bengaluru: Defence PSU Hindustan Aeronautics Ltd (HAL) said on Monday it has signed a Transfer of Technology agreement with National Aerospace Laboratories for the manufacture of the Bismaleimide Engine Bay Door for the series production of Light Combat Aircraft Tejas Mk1A.

Light Combat Aircraft (LCA) Tejas Mk1A is an indigenous 4.5 generation, all-weather and multi-role fighter aircraft for the Indian Air Force.

With the signing of the technology transfer for Bismaleimide (BMI) Engine Bay Door (EBD), HAL can directly produce these high temperature resistant composite parts for the series production of LCA Mk1A aircraft meeting the initial requirement of IAF squadrons, a joint statement said..

"BMI resins have excellent thermal, mechanical and chemical properties, and have a number of applications in the aerospace and electronics industries," according to an HAL official.

LCA Tejas Mk1A -- installed with the first set of Carbon-BMI Engine Bay Door assembly -- successfully completed the first flight from HAL facility here on March 28 this year

Over the last three decades, Bengaluru-based National Aerospace Laboratories (NAL), a constituent of the Council of Scientific and Industrial Research (CSIR), has developed many critical technologies for the LCA Tejas and continues to support this major national programme, it said.

India's Defence Sector on Self-Reliance Roll as HAL Bags Mega Fighter Jet Contract

18 April 2024

[Source: The Citizen | https://www.thecitizen.co.tz/tanzania/news/international/india-s-defence-sector-on-self-reliance-roll-as-hal-bags-mega-fighter-jet-contract-4599286](https://www.thecitizen.co.tz/tanzania/news/international/india-s-defence-sector-on-self-reliance-roll-as-hal-bags-mega-fighter-jet-contract-4599286)



The Hindustan Aeronautics Limited (HAL), an Indian public sector aerospace and defence company, has bagged the largest ever order for indigenous military hardware worth Rs. 65,000

crore placed by the Indian government.

The Indian Defence Ministry has issued the tender to HAL for 'Made-in-India' 97 LCA Mark M1 fighter jets, which will help to replace the old Mig fleet of the Indian Air Force (IAF).

The Indian government has made this major move as the country is developing a strong base of domestic defence industrial ecosystem to make India a strategic economy.

While addressing an event in December last year, Indian Defence Minister Rajnath Singh said the country's defence ministry is making all efforts to achieve the target of becoming self-reliant.

He said, "Our government is developing a strong base of domestic defence industrial ecosystem to make India a strategic economy."

The Defence Minister stressed that for the first time, the import of arms went down while exports rose.

"We issued five positive indigenisation lists, under which 509 defence equipment have been identified whose manufacturing will now be done indigenously," he said, adding that "In addition, we have also issued four positive indigenisation lists of Defence Public Sector Undertakings, in which 4,665 items have been identified and these will now be manufactured in our country."

While talking about the country's domestic defence manufacturing, Rajnath Singh said that the production had crossed the record figure of Rs 1,00,000 crore for the first time.

He stated that the total value of India's defence exports, which was Rs 1,521 crore in 2016-17, had increased almost 10 times to reach

a record level of Rs 15,920 crore in 2022-23.

During the Republic Day Parade on Kartavya Path in New Delhi on January 26 this year, besides showcasing its cultural diversity, women power, and military strength, Indian made a tacit display of efforts to indigenise the country's military hardware in line with the Aatmanirbhar Bharat (self-reliant India) slogan, which now defines the country's defence production and weapons acquisition programmes.

This missiles, radar systems, and weapons platforms in the parade represented India's homegrown defence capabilities, while the Ministry of Defence (MoD) decided to include only indigenously produced systems in the R-Day Parade.

This move by the Indian government reflects the confidence of a nation ready to shrug off the tag of being a net importer of weaponry, and realise its potential of becoming a global defence manufacturing hub.

With this, India is promoting indigenous manufacturing, while simultaneously cheerleading foreign original equipment manufacturers (OEMs) to set up shop in the subcontinent.

The plan of acquiring Indigenously Designed, Developed, and Manufactured (IDDM) platforms is now very relevant in the MoD, and this is the new 'normal' for the armed forces in India.

Industry players have become key stakeholders in this with the private defence manufacturing sector undertaking projects denied to it till recently, according to reports.

Private participation in the country's defence

sector in the three financial years, from 2018-2019 to 2021-2022, has been remarkable as private vendors cornered 72 deals from a total of 127 capital acquisition contracts signed with the erstwhile OFB, DRDO and PSUs during this period.

The Strategic Partnership Model (SPM), which is a good example of this, helps Indian companies form joint ventures with foreign OEMs to military hardware in India along with technology transfer.

Pilots, Engineers, Maintenance Crew — Skilled Worker Shortages Add to Crisis in Aviation Sector

Yuthika Bhargava | 16 April 2024

Source: The Print | <https://theprint.in/economy/pilots-engineers-maintenance-crew-skilled-worker-shortages-add-to-crisis-in-aviation-sector/2042221/>



The proposed CoE signifies a monumental stride in the strategic partnership between CSIO and HAL.

Thinkstock

New Delhi: India's aviation industry is witnessing a peculiar paradox. The sector is among the fastest growing spaces globally, but it is facing a human resource crisis, particularly a shortage of skilled workers.

This deficit is not limited to just pilots either, although the shortage of pilots has been in the news over the last few weeks due to the

troubles at Vistara. According to agencies that track human resources across the economy, the airline industry has a 17 percent deficit of skilled workers, which is only set to widen to 25 percent over the course of this year.

Last year, the aviation sector also witnessed a shortage of cabin crew staff, but this was ameliorated when GoFirst filed for insolvency in May 2023, which freed up workers for employment by other airlines facing a crunch.

“This absence of skilled professionals poses a formidable hurdle to the industry's upward trajectory, impacting pivotal roles such as pilots, air traffic controllers, engineers, and maintenance technicians,” said Dhriti Prasanna Mahanta, vice president and business head, TeamLease Degree Apprenticeship, an employability-focused talent development programme.

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Shortage Despite Unemployed Pilots

While the pilot shortage is a perennial issue, the Vistara crisis has managed to bring attention to the matter. The deficit exists despite the fact that there are about 4,000-5,000 young pilots who are still unemployed.

“The workforce shortage in the case of pilots is especially much higher as recruiting pilots takes much longer given the limited

supply, and training them also takes time and incurs high cost,” Gangakhedkar said. “Pilot training requires high investment and without sponsorship from an airline, it is difficult for many to self-sponsor for the training.”

Mahanta said that there was currently a 12-15 percent shortfall of trained and certified pilots.

“Manpower is a huge cost for airlines — it accounts for nearly 40 percent of their operating costs,” he said. “There is always a tussle between the airlines and the pilots over flying hours as it not only affects their pay, but also future opportunities.”

Why the shortfall despite the availability of qualified pilots who are unemployed? This may be due to the fact that airlines look for more experienced pilots, as training new ones takes time and costs money.

That the Directorate General of Civil Aviation (DGCA) issued a record 1,622 Commercial Pilot’s Licences (CPLs) in 2023, surpassing the previous milestone of 1,165 in 2022, does not excite aviation analysts or airlines too much.

“Merely getting a CPL doesn’t mean enough. It’s the base level. We have around 4,000-5,000 young pilots with CPLs who are currently unemployed. Airlines do not prefer to hire them,” said Sanjay Lazar, aviation expert and CEO at Avialaz Consultants, an aviation consultancy firm.

To attain the CPL, prospective pilots spend around Rs 40-50 lakh, following which they need to get a jet type-rating, a certification that allows pilots to operate certain types of aircraft. This could cost an additional Rs 20-

30 lakh. Alternatively, pilot aspirants join the cadet programmes of airlines, which typically cost up to Rs 1 crore.

“Further, once they get employed, they take a minimum of five-seven years to get to the command positions,” Lazar highlighted. “They join as first officers and later, post the airline transport pilot licence (ATPL) and 1500 hours of experience, they are made senior first officers and subsequently moved to command.”

He added that the government must look into the matter as there is a huge cost involved in becoming a pilot with jet ratings — the highest rating, which is required to operate large planes.

Team Lease’s Mahanta said that the cost of pilot training is high in India and the Ministry of Civil Aviation should introduce schemes to incentivise pilot training infrastructure. He also suggested that the University Grants Commission should, under the National Education Policy, introduce credit-based aviation courses in universities and colleges.

Lack of planning by airlines, government

Attributing the workforce shortage largely to lack of planning by airlines, sector analysts believe the government and the aviation regulator need to step in to ensure the airlines’ personnel planning is in conformity with their expansion plans.

“The pilot crisis did not happen overnight,” Lazar said. “It has been a perennial problem in the industry. The industry is growing at a very rapid pace, and we have not kept pace with this growth. Hence, there is a shortage of pilots, which leads to airlines using them excessively — resulting in fatigue for the pilots.”

While the airlines don't violate the relevant norms, Lazar said that they "do stretch them".

The situation has arisen mainly due to inadequate long-term planning by the airlines in terms of matching their acquisition of new aircraft with the number of pilots they have.

According to Lazar, it can take anywhere from six months to 10 years for a new or leased aircraft to come into the system, and about five-seven years or more for a pilot to get to the command level.

"The government and the regulator should step in and should demand a detailed airline roadmap for pilot and crew requirements in line with the aircraft and route expansions and not treat it lightly, as they do now," he said.

According to government data, as of March 2023, there were about 10,000 pilots employed with various airlines in India, which cumulatively had 771 aircraft at the end of last year.

Aviation research firm CAPA expects Indian carriers to have an order book for 2,000 planes by March next year, for which industry estimates a requirement of about 9,000-10,000 additional pilots. In 2024 so far, IndiGo, Air India and Akasa Air have collectively ordered 1,120 planes.

Further, the high demand for pilots in India is not exactly new information. The government has been aware of the issue for years now.

A parliamentary panel report, presented in Parliament in December 2022, noted the "acute shortage of skilled manpower and proper training institutes" in the aviation industry and estimated that there would be a growing requirement of around 1,000 pilots every year

in the near future in the country.

US aircraft maker Boeing also estimates that India may require 31,000 pilots over the next 20 years, or nearly 1,500 pilots every year.

Fixing the Crisis: How to get enough Trained Pilots

According to Frost & Sullivan's Gangakhedkar, India should focus on two key segments of the industry. The first, he said, is to develop pilot training schools offering comprehensive training with flight simulators, and support from airlines for student sponsorship programmes and simulators to support faster training.

The second is to develop a robust maintenance, repair and operations (MRO) ecosystem in the country supported by highly skilled certified technicians, which, he said, will aid in a further increase in India's MRO capabilities not only to support demand domestically but also of the region in the future.

Lazar added that the airlines must be incentivised to train young people rather than opt for expats who earn as much as Rs 20 lakh per month. For this, the DGCA must link the granting of Foreign Aircrew Temporary Authorization (FATA) licences for expat pilots to airlines inducting Indian CPL pilots.

"A tripartite collaboration between industry stakeholders, educational institutions, and governmental bodies emerges as a linchpin in effectively addressing this pressing issue," Mahanta said. "By leveraging their collective resources, expertise, and insights, these partners can devise tailored strategies calibrated to meet the evolving needs of the aviation landscape."

Currently, direct employment in aviation and aeronautical manufacturing stands at approximately 2,50,000 employees and this figure is expected to witness a significant increase, reaching around 3,50,000 by the end of 2024, according to him.

“In terms of roles, certain positions are anticipated to be in high demand,” he said. “For instance, the demand for pilots is expected to surge, with estimates suggesting a requirement of about 2,500-3,000 pilots in the upcoming year.”

He said that over and above this, roles such as aircraft mechanic service technicians, avionic technicians, safety and compliance managers, engineers, quality managers, airworthiness engineers, operations controllers, and ground staff are also expected to be in high demand, highlighting the diverse skill sets needed to support the expanding aviation industry.

Commentary

1. Countering constellations: Directed energy - <https://satelliteobservation.net/2024/04/02/countering-constellations-directed-energy/>

Further Reading

1. Ukraine, Allies Scour the world for Coveted Air Defense Systems - https://www.defensenews.com/global/europe/2024/04/19/ukraine-allies-scour-the-world-for-coveted-air-defense-systems/?utm_source=sailthru&utm_medium=email&utm_campaign=c4-overmatch
2. The Rules of Space haven't been Updated in 50 Yars, and the UN Says it's Time - <https://edition.cnn.com/2022/01/03/world/space-law-united-nations-partner-scn/index.html>
3. NASA may Alter Artemis III to have Starship and Orion Dock in Low-Earth Orbit - <https://arstechnica.com/space/2024/04/nasa-may-alter-artemis-iii-to-have-starship-and-orion-dock-in-low-earth-orbit/>
4. IAF's Smart Fences Plan will Greatly Strengthen Airfield Security - https://www.firstpost.com/opinion/iafs-smart-fences-plan-will-greatly-strengthen-airfield-security-13761674.html?utm_source=twitter&utm_ial&t=EKmt2cmb0opn5I8QPdDcrA&s=08
5. Russian Plane Crashes Hit a Record Low Despite Stringent Western Sanctions - <https://stratnewsglobal.com/world-news/russia-plane-crash-record-low/>

6. Boeing Dreamliner 787 could Break Apart Mid-Flight, Says Whistleblower - <https://www.indiatoday.in/world/story/boeing-dreamliner-787-whistleblower-safety-flaws-faa-aviation-regulator-planes-aircraft-2526130-2024-04-11>
7. India's Unified Air Traffic Management System: A Giant Leap Towards Safety, Efficiency - https://www.firstpost.com/opinion/indias-unified-air-traffic-management-system-a-giant-leap-towards-safety-efficiency-13758323.html?utm_source=twitter&utm_medium=social&s=08
8. Indian Army Test-Fires BrahMos, Akash missiles - <https://www.janes.com/defence-news/news-detail/indian-army-test-fires-brahmos-akash-missiles>
9. The Impact of AI-Driven Weather Forecasting In the Aviation Sector - <https://www.baselinemag.com/innovation/the-impact-of-ai-driven-weather-forecasting-in-the-aviation-sector/>
10. US Air Force Stages Dogfights with AI-Flown Fighter Jet - https://www.defensenews.com/air/2024/04/19/us-air-force-stages-dogfights-with-ai-flown-fighter-jet/?utm_source=sailthru&utm_medium=email&utm_campaign=c4-overmatch
11. Clear Space Debris Removal Mission Passes Key Milestone. - <https://europeanspaceflight.com/clearspace-debris-removal-mission-passes-key-milestone/>

“The term ‘Aerospace’ was introduced in 1958 by the USAF Chief of Staff, General Thomas D White, as a new construct that depicted air and space as a seamless continuum stretching from the Earth’s surface to infinity.”



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