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Image Courtesy: Indian Air Force

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"As we navigate the uncharted skies, Air Power being a key component of national power; would undoubtedly play a pivotal role and also serve as a symbol of national strength, a tool for peace and cooperation."[1]

- Air Chief Marshal VR Chaudhari PVSM AVSM VM ADC

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[1] https://economictimes.indiatimes.com/news/defence/militarisation-weaponisation-of-space-inevitable-reality-iaf-chief/articleshow/108826869.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst

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Opinions and Analysis

America's Military has the Edge in Space. China and Russia are in a Counterspace Race to Disrupt it

Simone McCarthy | 27 May 2024

Source: CNN | https://edition.cnn.com/2024/05/27/china/counterspace-us-china-russia-intl-hnk-scn/index.html

CNN/Getty Images/Adobe Stock

As Russian forces rolled over the Ukraine border in the first moments of their invasion, another, less visible onslaught was already underway – a cyberattack that crippled internet linked to a satellite communications network.

That tech offensive – conducted by Russia an hour before its ground assault began in February 2022 – aimed to disrupt Kyiv's command and control in the pivotal early moments of the war, Western governments say.

The cyberattack, which hit modems linked to a communication satellite, had far-reaching effects – stalling wind turbines in Germany and cutting the internet for tens of thousands of people and businesses across Europe. Following the attack, Ukraine scrambled for other ways to get online.

For governments and security analysts, the cyberattack underscored how satellites — which play an increasingly critical role helping militaries position troops, run communications, and launch or detect weapons – can become a key target during war.

As countries and companies build out satellite constellations, a growing number of governments are vying for technology that could disrupt or even destroy adversaries' assets – not just on land, like Russia's alleged cyberattack – but in space too.

Enter signal jamming and spoofing, high-powered lasers to dazzle imaging sensors, anti-satellite missiles and spacecraft with the capacity to interfere with others in orbit – counterspace technologies that analysts say leading powers like the United States, Russia and China could use to target each other's satellites.

An extreme example of a potential counterspace weapon was thrown into the spotlight earlier this year when US intelligence suggested, according to CNN reporting, that Russia was attempting to develop a space-based, anti-satellite nuclear weapon – a claim Moscow has denied.

Far from only affecting military-use satellites, such a weapon could have broad, devastating impacts – for example, upending satellites the world relies on to predict the weather and respond to disasters, or even potentially affecting global navigation systems used for everything from banking and cargo shipping to hailing a ride share and ambulance dispatch.

Last week, the US accused Russia of launching a satellite "presumably capable of attacking others in low Earth orbit," with American

officials saying it follows prior Russian satellite launches of likely "counterspace systems" in 2019 and 2022.

Tracking countries' development of counterspace capabilities is difficult, given their closely guarded nature and the dual use ambiguity of many space technologies.

Both Russia and China have advanced their development of tech that could be used for such purposes in recent years, while the US builds on related space research and capabilities, according to experts and open-source reports.

Development of counterspace technologies is playing out amid a new era of focus on space – where the US and China are competing to put astronauts on the moon and build research bases there and advances in satellite launch technology mean a growing number of actors, including US adversaries like North Korea and Iran, are putting assets in orbit.

And as geopolitical rivalries mount on Earth, experts say Beijing and Moscow are increasingly interested in finding ways to deny the US – as the country with the most ground-based capabilities linked to space – the ability to use them.

Counterspace Race

The idea of weapons aimed at or positioned in space remains highly controversial, but it isn't new.

Decades ago, the US and the Soviet Union vied for technologies to knock-out each other's satellites, with Russia's 1957 launch of Sputnik – the world's first artificial satellite – quickly followed by US counterspace tests.

Since the fall of the Soviet Union, America has become the pre-eminent power when it comes to capabilities in space linked to conducting military operations on Earth, analysts say – a strength Russia and China have hoped to turn against it to even the battlefield.

"Developing counterspace capabilities such as (anti-satellite) weapons provides a means to disrupt your adversary's space-based capabilities, whether it is communication, navigation, or command and control systems and logistics networks that rely on space-based systems," said Rajeswari Pillai Rajagopalan, director of the Center for Security, Strategy & Technology at the Observer Research Foundation in New Delhi.

"Denying the US any advantage it may have from the use of space in a conventional military conflict is what is driving Russia and China in terms of their capability development and strategies," she said.

To this end, Russia is believed to have dusted off Cold War-era anti-satellite research programs, such as for the development of an "aircraft-borne laser system" to disrupt imagery reconnaissance satellites, according to an annual report by the independent US-based Secure World Foundation (SWF) released in March.

New evidence suggests Russia may also be working to expand on its ground-based electronic warfare capabilities with the development of space-based technology for jamming satellite signals in orbit, said the report, which is compiled

using open-source intelligence.

In recent years, Russia has also launched spacecraft that appear able to surveil foreign satellites – with the high velocity of two of these devices and suggestions others were able to release aerosols indicating they could be weapons tests, according to SWF.

China announced its own counterspace ambitions in 2007 when it launched a missile some 500 miles into space to take down one of its own aging weather satellites. The move broke a decades-long, post-Cold War lull in such destructive, "direct ascent" anti-satellite missile testing, and was followed by similar operations from the US, India and Russia.

Since then, China is believed by analysts to have conducted multiple, nondestructive missile tests that could advance its ability to target satellites. The most recent of those was last April, according to SWF, though, like others, that was described by Beijing as a missile intercept technology test.

China is also believed by the US Space Force to be "developing jammers to target a wide range of satellite communications" and to have "multiple ground-based laser systems."

Other Chinese operations in space are difficult to explicitly classify as weapons research but could have a military purpose, experts say. Those include satellites that can approach or rendezvous with others in orbit, such as for support and maintenance purposes, like the Shiyan-7, launched in 2013 and likely equipped with a robotic arm.

There is suggestion from within China of the potential dual use of such technology. In a 2021 state media interview, Zang Jihui, a People's Liberation Army (PLA) engineer, described China's experiments with a satellite "equipped with a robotic arm, able to change orbit and conduct all-round detection of other satellites" as part of its "anti-satellite capabilities."

Beijing included safeguarding its "security interests in outer space" as among its national defense goals in a 2019 white paper, but has long said it stands "for the peaceful use of outer space" and opposes an arms race there. SWF says there is no confirmed public evidence of China using counterspace capabilities against any military targets.

Russia has also said it opposes weapons in space. Both countries in recent years have established military forces dedicated to aerospace, as has the US, which launched its Space Force in 2019 as the first new military branch since 1947.

US officials have described America as a leader in advancing the "responsible and peaceful use" of outer space. And given its reliance on space for its defense, experts say the US military has the most at stake when it comes to ensuring countries don't use technologies against satellites there – one reason analysts say the US policy community has long shunned placing weapons in space.

Among all nations, only non-destructive capabilities like signals jamming have been actively used against satellites in current military operations, according to SWF.

'Deny' China

Since it took down one of its own malfunctioning satellites with a missile in 2008 after China's test, Washington has pledged to no longer conduct such destructive, direct-ascent anti-satellite missile tests, which can generate dangerous space debris, and is not believed to have an operational program for such capabilities.

It also doesn't have an acknowledged operational program to target satellites from within orbit using other satellites or spacecraft, though it could likely quickly field one in the future, according to SWF.

That's because the US has done extensive non-offensive testing of technologies to approach and rendezvous with satellites, including close approaches of its own military satellites and several Russian and Chinese military satellites, SWF says.

The US only has one acknowledged, operational counterspace system – electronic warfare capabilities to interfere with satellite signals – and its army is widely seen to have advanced abilities to jam communications and capabilities to interfere with certain navigation satellites. It also has considerable research on ground-based lasers that could be used to dazzle or blind imaging satellites, according to SWF, which says there's no indication those have become operational.

Speaking in Washington in November, US Chief of Space Operations Gen. Chance Saltzman explained why the US felt it needed to be able to counter other countries' space capabilities. He pointed to what he described as a "kill web" strategy used by China's PLA to enhance the range and accuracy of its weapons within the strategically important "second island chain," running from Japan to Guam.

"That is all a space-enabled capability," Saltzman said.

And should Beijing decide to use those weapons, "We have to be able to deny (China) access to the information to break that kill chain so that our joint forces are not immediately in target and in range inside the second island chain," he said.

Meanwhile, concerns about potential adversaries' space activities have pushed US allies, including France and Australia, to seek counterspace abilities – often non-destructive ways to interfere with enemy satellites, known as "soft-kill" capabilities, such as lasers to disrupt surveillance and jamming.

Israel has also said it used GPS jamming in its war in Gaza to "neutralize" threats, likely ground-based efforts to avert missiles that reach their target using GPS tracking.

More broadly, there has been a trend toward shorter-term-impact measures like jamming, spoofing and cyberattacks that don't permanently damage or destroy a target, according to Juliana Suess, a research fellow for space security at London-based defense think tank RUSI.

"(Actors) don't need to invest a whole lot of money into manufacturing these big sci-fi sounding anti-satellite weapons – they can just disrupt a whole network through a cyberattack," she said.

'Wipe out'

More than 7,500 operational satellites are

orbiting the Earth, according to the most recent figures from the Union of Concerned Scientists (UCS) in May 2023.

Of those satellites, more than 5,000 were US-owned, with most of them commercial. Nearest competitor China – which has been increasing its satellite launches – had 628, followed by Russia with fewer than 200, according to UCS.

Since it invaded Ukraine, Moscow has accused the West of using commercial satellite systems for military purposes and warned that "quasi-civil infrastructure may become a legitimate target for retaliation."

Russia has also been accused of mounting cyberattacks against the largest commercial satellite constellation, American company SpaceX's Starlink, which has been an asset for the Ukrainian military.

When it comes to allegations of developing a nuclear space-based weapon, Moscow has slammed the West as attempting to "assign to us a certain plan of action which we do not have."

A nuclear weapon in space would be a potential last-resort option – or hanging sword – for its potential to wipe out a wide swath of satellites, albeit indiscriminately.

If Russia is developing such a weapon, its concerns about American constellations like Starlink that have shown military utility are "likely a key motivating factor," according to Tong Zhao, a senior fellow at the Carnegie Endowment for International Peace think tank in Washington.

One reason is that as satellite constellations proliferate – aided by advances that have made launches in low Earth orbit (no more than 1,200 miles above the planet) cheaper and easier – it could be difficult for an attacker to cause an impact by simply targeting a single satellite.

By contrast, "employment of such (nuclear) weapons in space could wipe out large satellite constellations, potentially creating long-lasting debris and radioactive remnants that render orbits unusable for military and civilian purposes," Zhao said. That, he added, could also inflict "an inconceivable setback on the preservation of space as a common domain for future human development."

Chinese scientists have expressed concern about a potential national security risk of Starlink, with a group writing in the peer-reviewed domestic publication "Modern Defense Technology" in 2022 that "a combination of soft and hard kill methods should be adopted to incapacitate some Starlink satellites functioning abnormally and destroy the constellation's operating system."

It's unclear whether this view reflects thinking within the Chinese government.

Chinese researchers have also considered the ramifications of nuclear detonation in space, with a separate group at a nuclear technology institute publishing research last year on computer simulations of the impact of such blasts at different altitudes, in which they noted there could be potential effects on satellites and other aircraft.

Space treaty

Nuclear weapons already have a controversial history linked to space.

America's 1962 Starfish Prime nuclear test some 250 miles over Earth damaged at least a third of the 24 satellites operating around that time, according to military documents. It also knocked out powerlines in Hawaii and turned the sky above it a violent shade of orange for hours. The test, launched from Earth, was part of series to evaluate the effect of such explosions, including against ballistic missiles.

Five years later, countries concerned about the heating space race and nuclear standoffs banned the stationing of weapons of mass destruction in space with the 1967 Outer Space Treaty, which doesn't explicitly ban conventional weapons in orbit or missiles launched from Earth.

Though decades old, experts say that treaty – which affirms that space should be used for the benefit of all countries and is endorsed by Washington, Beijing and Moscow – remains a bedrock for a domain that lacks extensive international norms to ensure peace.

Its tenets may be more relevant now than ever – but potentially under greater threat amid a new focus on military and space.

Last month, Russia vetoed an effort in the United Nations Security Council led by the US and Japan to reaffirm the Outer Space Treaty principles, including the obligation not to place nuclear weapons in space. The resolution would have been the council's first on outer space and was supported by all other members besides China, which abstained.

Instead, China and Russia, which have long worked together to shape rules around weapons in outer space, pushed for that resolution to be broadened to ban the placement of any weapons in space.

Using language that appeared to target the US, it called on "all states, and above all those with major space capabilities" to prevent the "threat or use of force" in space. A second draft resolution backed by Russia that included that amendment, was rejected by the council last week, with the US calling it "disingenuous."

Any future efforts to agree on rules for space face a complicated outlook, experts say.

For example, placement in space of a nuclear weapon like the one Russia is reportedly considering would have far-reaching implications on how space is used – and how weapons are controlled, according to RUSI's Suess.

"If the Outer Space Treaty was broken in such a way, it would make it even harder to imagine where multilateral efforts can go from here," she said.

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How Better Understanding of Ground Operations Safety can Ensure Safer Aviation

Air Marshal Anil Chopra | 18 May 2024

Source: First Post | https://www.firstpost.com/opinion/how-better-understanding-of-ground-operation-safety-can-ensure-safer-aviation-13772296.html

The intricacies and risk to safety during runway operations are at a much higher and different level, where mistakes can be catastrophic. Source: AP

A Delhi-bound Air India flight with 180 passengers onboard collided with a tug tractor at Pune Airport on Thursday (May 16). The collision resulted in damage to one of the aircraft's wings and a tyre. Around 180 passengers were safe but stranded at the airport.

As civil aviation grows exponentially, the airports are becoming a complex maze of moving aeroplanes and ground support vehicles, sometimes at higher speeds than desired, requiring high levels of situational awareness and human attention to avoid collisions.

Ground handling accidents/incidents by definition include collisions with an aircraft, person, ground vehicle, obstacle, building, structure, etc, but exclude ground collisions categorised under runway excursion/incursion operations and wildlife strikes. The intricacies and risk to safety during runway operations are at a much higher and different level, where mistakes can be catastrophic. These are not in the scope of this article.

The safety challenges of ground operations involve possible collisions between aircraft, ground vehicles, and aerobridges. The next most risky phase is aircraft pushback, powerback, and towing. Significant ground occurrences happen when the aircraft is parked, during maintenance, loading, and unloading. There is thus a need for continuous study to ascertain potential manoeuvring area conflicts.

A Typical Airport

A typical airport like Indira Gandhi International Airport (IGIA), New Delhi, is spread over 5,220 acres and has four runways with a myriad network of taxiways connecting parking aprons. It handled 65.5 million passengers in 2023. A large number of activities have to be handled to transport an air passenger. Safety is more relevant for movement on aircraft operating surfaces. A variety of vehicles are plying for crew and passenger transportation, luggage trolley trains, airport security, flight and fire safety, flight refreshments, aircraft maintenance, towing tractors and alighting ladders, refuelling trucks, and airfield works contractors, among many others. The vehicles repeatedly cross the aircraft taxi paths. Construction vehicles may carry or drop ready-to-be-sucked-in foreign objects.

The aircraft operating from various aprons have to taxi through a complex ground routing towards the same final aircraft departure holding point, sometimes in near-zero visibility

conditions. Often, there is incoming and outgoing reciprocal aircraft traffic in close proximity to each other. This entire ground movement is a high-risk exercise with a scope for error. Although close control is exercised, statistics show hits and misses.

Major Recent Ground Collisions

On March 24, an IndiGo aircraft grazed the wings of an Air India Express in Kolkata. This resulted in both aircraft sustaining significant damage to their wings. On April 6, 2024, a Virgin Atlantic Boeing 787-9 collided with a British Airways Jet Airbus 350 while it was being towed at Heathrow Airport. The winglets of the aircraft contacted the tail of the nearby BA aircraft.

On March 28, 2018, a Boeing 767-300 and a Boeing 737-700 were being simultaneously pushed back in darkness from adjacent parking positions, as cleared, when their respective tailplanes collided, causing substantial damage. The investigation found that the 737 clearance conflicted with that of the 767 aircraft. The controller's error had been compounded by the wingwalkers being in the drivers' cabs because it was raining.

On February 13, 2019, a Boeing 787 at Amsterdam was given a non-standard long pushback by ATC in order to clear the stand for an incoming flight. Also, a nearby Boeing 747 was subsequently given a normal pushback. The single tug-driver of the 747 was unaware of the abnormal position of the 787 and could not see it before or during his pushback; a collision followed.

On June 16, 2021, a Boeing 737-400 was taxiing for departure at night. After completing the pushback, when the ground crew arrived back at their base, they realised that the tow bar they had used was missing. Meanwhile, the aircraft had taxied over the unseen tow bar and sustained damage to both nose tyres.

On September 8, 2020, an airport maintenance team driving at night on the active runway centerline at Birmingham was unaware that an inadequately secured 2-metre-long ladder had fallen from their pickup truck. Three aircraft then landed in the following half hour, narrowly missing the ladder before it was discovered and the runway closed.

On May 10, 2019, a Bombardier DHC8-300 taxiing into Toronto at night was hit by a fuel tanker travelling at approximately 40 kmph. The investigation attributed the collision to the vehicle driver's limited field of vision in the direction of the aircraft and a lack of action to compensate for this.

In October 2012, there was a ground incident in Chennai when Air India flight 5184 to Jeddah was being towed towards the taxiway. The tow driver did not notice a trolley on the path. The aircraft was brought to a halt after one of its engines hit the trolley handle, leaving a big hole in the aircraft's body.

Once, on seeing a red light, an aircraft stopped four to six feet short of its normal gate position. Very shortly thereafter, a green light indicated continuing taxi. After moving about one foot, the aircraft contacted something. A fuel truck had moved into position when the aircraft stopped for the first time.

Causes of Ground Accidents

An aircraft could take a taxi route or a manoeuvring area with potential conflict after an incorrect air traffic control (ATC) clearance. Alternatively, non-conformance with ATC clearance due to spatial or positional confusion or due to misinterpretation or misguided clearance by the aircrew Within the cockpit, there could be poor crew resource management (CRM).

An aircraft could hit another aircraft or vehicle while taxing. An aircraft could contact a fixed object like a pole or ground equipment while taxing or towing. A ground vehicle may be driven into the aircraft. Unmanned equipment could roll into the aircraft.

The jet engine exhaust gases from large aircraft could pose a threat to a parked small aircraft if there is less than a safe parking distance. Jet efflux could also push ground equipment that may go and hit another aircraft or ground equipment. Once a pilot opened the high engine power on the outer engine to negotiate a tight turn, the jet blast blew a mechanic and an aircraft engine cowling off the stand. It might have been better to use a tug.

Inadequate signage, markings, and lighting that enable aircraft flight crews to comply with taxi clearances can cause collisions. Lack of professional aviation training for the various contractors who conduct and supervise aircraft ground-handling tasks in the vicinity of an aircraft parking stand/gate could be an issue. Ground equipment may sometimes be parked outside the marked areas, thus encroaching on aircraft movement areas.

The highest risk of wing tip or tail plane collision occurs when multiple aircraft are holding or taxiing in the manoeuvring area, especially at night. Flight crews have to be alert and conscious of the physical clearance during a turn in which the wing tip or aircraft tail describes different arcs due to the geometry of the aircraft and the arrangement of the landing gear.

Statistics tell us that apron incidents happen 58 per cent during arrivals and 35 per cent during departures, the remaining being miscellaneous. Local conditions related to gate allocation and ramp procedures may be loosely defined. At this stage, the flight crew is often no longer in contact with ATC, and communications with ground crew are likely to be primarily visual. On the other hand, departures are under the direct control of ATC.

In aircraft-to-aircraft damage 18 per cent incidents happen on the taxiway in the apron area, and 39 per cent occurred at the Gate Entry or Exit Area. The largest percentage of the incidents, 43 per cent, occurred within the Gate Stop Area, that is, within 20 feet of the nose-wheel parking line. At this point, the flight crew is usually relying entirely on ground crew guidance for clearance from obstacles and for final taxi instructions. A possible explanation is that there are more obstacles to encounter when entering the more congested area next to gates and terminal buildings. Pushback is another area of risk. Continuing to work despite activity overload due to cockpit duties, or for ATC controllers also creates conditions for such incidents.

Aviation Regulatory Bodies

Civil aviation is a highly regulated business. The Federal Aviation Administration (FAA) in the US, the European Union Aviation Safety Agency (EASA), and the Directorate General of Civil Aviation (DGCA) in India, as well as the United Nation's International Civil Aviation Organisation (ICAO), regulate and design standard operating procedures (SOP) for aviation safety.

How to Prevent Collisions

Many accidents are repetitive in nature. It is important to collate accident/incident data to analyse situations, time of occurrence, causes, and educate all personnel repeatedly and forewarn them. Ground handling has to be given similar importance as flight safety.

Direct visual detection of conflict on the manoeuvring area by aircrew or driver; indirect detection using remote camera displays; detecting a situation using basic surface-movement radar; and most importantly, the situational awareness of ATC staff, aircrew, and all ground crew on the manoeuvring area is important. Conflict resolution by an air traffic controller, an alert aircrew, or a vehicle driver can mitigate the risk.

Ramp or apron safety is a shared responsibility of all the stakeholders involved, such as the airport operator, the ground handling agent, the airline, and the regulatory authority. The SOPs and checklists, need meticulous following.

Aircraft damage prevention requires the coordination and cooperation of the aircrew, the dispatcher, the ground handler, and the maintenance technician. There is perhaps a need for certification for the marshalers and wing-walkers. They, along with tug-driver have an important role. Using appropriate markings and signals are necessary. There are also cases of incorrect or inappropriate aircrew responses to ground crew actions or instructions. Non-human guidance systems such as marginally visible taxi lines, poorly-placed lead-in lights, and building-mounted light systems also contributed to incidents. Proper lighting during adverse visibility conditions is instrumental in preventing accidents. Moving at a slower speed and following light markers is important.

Ground support equipment (GSE) includes the vehicles and tools that are used to support the ground handling operations, such as tugs, loaders, stairs, carts, generators, and de-icing equipment. GSE must be operated and maintained in accordance with the manufacturer's specifications, the airport rules, and the safety regulations, avoiding collisions or obstructions. They must be parked only at the designated, marked places.

Aircraft fueling is one of the most critical and hazardous ground handling operations, as it involves the transfer of large quantities of flammable substances. ICAO has set fueling standards and procedures. Ensuring proper grounding and bonding of the fueling equipment and the aircraft, preventing fuel spills and leaks, and avoiding potential sources of ignition.

Baggage handling, loading, and unloading is another important and challenging ground handling operation. The baggage trolley train has to be manoeuvred carefully from the

terminal to the tarmac. Using suitable lifting techniques and equipment and securing the baggage and cargo properly are important. Large cargo pallets require special loading equipment. Staff safety is also important.

Direct and Indirect Costs

There are direct and indirect costs associated with each incident. The aircraft gets grounded. It takes time to repair. Repairs and part changes cost money. Flights have to be rescheduled, which causes passenger inconvenience and also affects the reputation of the carrier. In cases of injuries to passengers or ground staff, they require medical treatment. Employee injury is a large financial loss to the company in terms of flight delays, employee lost time, insurance, medical, and other costs. Two-thirds of those injured were invariably ground crew.

As per the International Air Transport Association (IATA), there is one ground incident, injuring around nine people, for every 1000 departures. These cost approximately $10 billion to the industry every year. A safety specialist from the United Kingdom Flight Safety Committee stated the worldwide loss in dollars equivalent of fifteen Boeing 747-400s is lost each year to equipment damage during ramp operations.

Way Ahead

The insurance industry statistics indicate that, when measured in terms of passenger-distance, air travel is the safest. On a 'fatality per mile' basis, air is six times safer than travel by car, and twice as safe as rail. However, when calculating risk per journey, over a billion journeys, air travel is three times more dangerous than car travel and 30 times more risky than bus travel.

Many incidents occur when the aircraft is parked, of which 90 per cent are caused by actors and 10 per cent by the aircraft itself. Damage is most frequently inflicted by actors who strike vehicles or equipment on the aircraft. Each airport must carry out a SWOT (strengths, weaknesses, opportunities, and threats) analysis of safety policies, processes, procedures, and activities.

Airports the world over are trying to identify high-risk hotspots on each airfield and caution pilots and drivers. Runway and taxiway markings and signage are being reviewed; more ground radars are coming up. Aircrew are expected to act as safety backups to controllers. Check lists for airfield procedures are digitised and regularly reviewed.

Training packages to foster teamwork between aircrew and controllers have evolved. Training and education packages for drivers have been put in place. They are expected to have manoeuvring area charts in vehicles. Speed restrictions, vehicle lights, and monitoring the ground radio channel are briefed.

Ultimately, the responsibility for the safe operation of the aircraft rests with the flight crew. They must take action to prevent incidents. If no taxi guidance is provided, "stop taxing." If the marshaler is lost from sight, stop.

IGIA is gearing up for 100 million passengers a year. Air is going to be the means of travel for more and more people. Ground

accidents are highly avoidable. It is time for action and to exercise greater control. Anyone on an operating surface has to have situational awareness. Being safe and vigilant is the only way.

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Air Power

RudraM-II Air-to-Surface Missile Successfully Flight-Tested by DRDO from Su-30 MK-I off the Odisha Coast

29 May 2024

Source: PIB | https://pib.gov.in/PressReleasePage.aspx?PRID=2022076

Defence Research & Development Organisation (DRDO) successfully flight-tested the RudraM-II air-to-surface missile from Su-30 MK-I platform of the Indian Air Force (IAF) off the coast of Odisha at around 1130 hours on May 29, 2024. The flight-test met all the trial objectives, validating the propulsion system and control & guidance algorithm. The performance of the missile has been validated from the flight data captured by range tracking instruments like electro-optical systems, radar and telemetry stations deployed by Integrated Test Range, Chandipur at various locations, including the on-board ship.

RudraM-II is an indigenously-developed solid-propelled air-launched missile system meant for Air-to-Surface role to neutralise many types of enemy assets. A number of state-of-the-art indigenous technologies developed by various DRDO laboratories have been incorporated in the missile system.

Raksha Mantri Shri Rajnath Singh congratulated DRDO, IAF and industry on the successful test-flight of RudraM-II. The successful test has consolidated the role of the RudraM-II system as a force multiplier to the Armed Forces, he said.

Secretary, Department of Defence R&D and Chairman DRDO Dr Samir V Kamat complimented the DRDO team for their untiring efforts and contribution culminating into the successful flight test.

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Ukraine Wiped out 100 Russian Troops at Once in a Strike Showcasing the Range and Power of its New US ATACMS

Thibault Spirlet | 09 May 2024

Source: Business Insider | https://www.businessinsider.in/international/news/ukraine-wiped-out-100-russian-troops-at-once-in-a-strike-showcasing-the-range-and-power-of-its-new-us-atacms/articleshow/109819475.cms

An Army Tactical Missile System during live-fire testing at White Sands Missile Range in New Mexico, December 14, 2021. White Sands Missile Range/John Hamilton

A Ukrainian ATACMS long-range missile strike killed more than 100 Russian soldiers in an occupied region 50 miles from the front line, according to OSINT and military analysts.

Ukrainian forces targeted a Russian military training area some 50 miles behind the front line in the occupied Luhansk Oblast in eastern Ukraine, per an assessment by The Institute for the Study of War.

According to two aerial geolocated videos posted on Wednesday by X user Osinttechnical, an account affiliated with the Centre for Naval Analyses, Ukraine appeared to strike the training area with three US-supplied M39 ATACMS tactical ballistic missiles.

Osinttechnical said at least one of the missiles struck a gathering of more than 100 Russian soldiers, with hundreds of M74 APAM bomblets falling on them.

Open-source geolocation project GeoConfirmed said four ATACMS were used in the attack, with the location being the village of Rohove in eastern Ukraine. One of its volunteers shared footage on X, saying that the four strikes happened within the space of a minute.

Business Insider couldn't independently verify details of the attack.

The reported attack comes after the US secretly sent about 100 Army Tactical Missile Systems, or ATACMS, to Ukraine last month, according to The New York Times.

The US had previously sent ATACMS with a shorter range to Ukraine, but the versions sent recently can travel about 190 miles — which puts higher-value targets in Ukraine's crosshairs.

An unnamed senior US official told the Times that Ukrainian soldiers already put them to use to attack a Russian military airfield in Crimea in mid-April.

Ukraine said that strike targeted the Dzhankoi military base in northern Crimea, destroying or critically damaging four S-400 launchers, three radar stations, air-defense equipment, and airspace surveillance equipment.

The longer-range ATACMS could prove crucial for Ukraine, as they can travel about 190 miles and hit higher-value targets in places like Crimea, which has been occupied by Russia since 2014.

Philip Karber, a military analyst with expertise on Ukraine, told Radio Free Europe this week that the long-range ATACMS have the potential to "basically make Crimea military worthless."

The US sent Ukraine ATACMS with a shorter range last fall, which enabled Ukraine to destroy Russian helicopters and airfields behind the front lines, but not go after more distant targets.

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IAF Successfully Airdrops Portable Hospital BHISHM in Agra

16 May 2024

Source: Hindustan Times | https://www.hindustantimes.com/india-news/iaf-successfully-airdrops-portable-hospital-bhishm-agra-watch-101715827858434-amp.html

Weighing about 720kg, the portable hospital was dropped from 1,500 feet using specially designed parachutes. (X)

The test aimed to assess the capability of portable hospitals to be deployed across the country during emergencies. Weighing about 720kg, the portable hospital was dropped from 1,500 feet using specially designed parachutes by the Air Delivery Research and Development Establishment (ADRDE) in Agra.

In a post on X, the IAF said, “An IAF C-130 aircraft did a trial paradrop of Arogya Maitri Disaster Brick . An innovation aiding swift disaster relief by being para dropped, these 'bricks' contain essential survival material for disaster stuck locations unreachable by other means. The trial was undertaken in coordination with an Army Para Field Hospital and was witnessed by Air Mshl Rajesh Vaidya, DGMS (Air), Chairman of Arogya Maitri Task Force. The accurate drop ensured no damage to the contents, marking a successful trial.”

The release said, “The Aid Cube is equipped with several innovative tools designed to enhance disaster response and medical support during emergencies. It integrates Artificial Intelligence (AI) and data analytics to facilitate effective coordination, real-time monitoring, and efficient management of medical services in the field.”

It consists of two master cages, each of which has 36 mini cubes. Each unit contains 72 components that can be easily transported and are extremely flexible as they can be carried by hand, cycles or drones.

During mass casualty incidents (MCIs), varying from basic aid to advanced medical and surgical care, the Aid Cube can be deployed in just 12 minutes. This is vital, as it closes the critical time gap from initial care to definitive

care, potentially saving lives during the initial hours in case of emergencies.

It hosts medical amenities like an operation theatre, X-ray machines, blood testing devices, ventilators, and equipment to treat injuries like gunshot wounds, burns, fractures, as well as severe bleeding. Each unit has essentials like a compact generator, stretchers, modular medical gear, medications, and food supplies. It uses solar energy and batteries for sustainability, India Today reported.

A senior IAF officer told India Today that the project costs about ₹1.50 crore.

The BHISHM cubes are waterproof and lightweight and have been designed with various configurations in mind, making them ideal for emergencies. They can be deployed anywhere through airdrops or ground transportation.

The release added, "Advanced medical equipment, RFID-tagged for efficient repacking and redeployment, is a key feature of the Cube. The state-of-the-art BHISHM software system integrated into a provided tablet allows operators to locate items quickly, monitor their usage and expiry, and ensure readiness for subsequent deployments."

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Ukraine Will Get Ex-French Mirage 2000-5 Fighters

David Axe | 06 June 2024

Source: Forbes | https://www.forbes.com/sites/davidaxe/2024/06/06/ukraine-will-get-ex-french-mirage-2000-5-fighters/?sh=441893a1b332

A French air force Mirage 2000-5.WIKIMEDIA COMMONS

France will donate surplus Dassault Mirage 2000 fighters to Ukraine, French Pres. Emmanuel Macron announced on Thursday.

The timing of the announcement—the 80th anniversary of the Allied invasion of Nazi-occupied France—is no accident. "The moment for peace can only come if Ukraine resists," Macron said.

The Mirage deal has been in the works for many months. "We are talking about fighter planes with France," Ukrainian Pres. Volodymyr Zelensky said in February.

Macron specified that the jets would be Mirage 2000-5s, which are optimized for air-to-air combat—and not older Mirage 2000Cs or air-to-ground Mirage 2000D attack jets. All the variants share the same basic shape and performance: a tailless delta wing, a single engine, a nose-mounted multi-mode radar and supersonic speed.

The choice of variant makes sense. The French air force retired its last few 1980s-vintage Mirage 2000Cs in 2022. Last year, a French official said just 13 Mirage 2000Cs still had "a bit of potential." The French air force is upgrading most of its 80 or so Mirage 2000Ds for continuing service.

Surviving French Mirage 2000-5s—out of the 37 "dash-fives" Dassault built for the French air force in the 1990s—are scheduled to retire between now and 2029, but French Defense Minister Sébastien Lecornu has said their replacements, new Dassault Rafales, could arrive early—and speed up the process.

With a little bureaucratic urgency, there's no reason France couldn't equip the Ukrainian air force with a couple of dozen Mirage 2000-5s—enough to replace an existing Ukrainian fighter brigade or form a new brigade—in time to support the current conflict.

The Ukrainian air force went to war in February 2022 with around 125 warplanes, including Sukhoi Su-24 and Sukhoi Su-25 attack planes and Sukhoi Su-27 and Mikoyan MiG-29 fighters.

In 28 months of hard fighting, the Ukrainians have lost around 80 jets, but have replaced most of them with donated airframes from former Soviet satellite states—Macedonia, Poland and Slovakia—along with old airframes they pulled out of long-term storage and restored to flyable status.

Further reinforcements are on the way. Belgium, Denmark, The Netherlands and Norway have pledged a combined 85 Lockheed Martin F-16s—the first of which should arrive in a few weeks around the same time the first group of Ukrainian pilots complete their training in the United States, Denmark and Romania.

France or some other Mirage 2000 user—Greece, for example—will have to train Ukrainian crews on the delta-wing jet. France will "offer to train the pilots," Macron said, without specifying a timeframe. This, more than the availability of airframes, could determine the pace of the Mirage initiative.

It might take a while—potentially a year or more, if the F-16 initiative's deliberate progress is any indication—but barring a shock Russian victory or some negotiated end to the war, Mirage 2000s should eventually fly into battle over the 700-mile front line in Ukraine.

The type's merits are well-known. "The dash-five is a rather old aircraft, but it is also specialized," French air force Col. Anne Labadie told Combat Aircraft. "It is an aircraft exclusively dedicated to air defense, and its pilots are specialized in this."

If the Mirage 2000s were available to Ukraine today, it's apparent what the Ukrainians would do with them: sortie them against the Russian air force Sukhoi fighter-bombers that have been ruthlessly bombarding Ukrainian troops and civilians with as many as 3,000 precision glide bombs every month.

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China is 'Aggressively Recruiting' Pilots from the US and NATO Countries, Intelligence Agencies Warn

Thomas Novelly | 06 June 2024

Source: Military.com | https://www.military.com/daily-news/2024/06/06/china-aggressively-recruiting-pilots-us-and-nato-countries-intelligence-agencies-warn.html

A U.S. Air Force F-16 Fighting Falcon pilot taxis after landing during Red Flag-Alaska 24-2 at Eielson Air Force Base, Alaska, May 31, 2024. (U.S. Air Force photo by Airman 1st Class Patrick Boyle)

American intelligence agencies are warning that China is working hard to recruit American military pilots, as well as aviators from NATO and ally countries, as tensions continue to rise in the Pacific.

The warning about China's recruiting methods came in a bulletin published Wednesday by the Office of the Director of National Intelligence, along with Australia, Canada, New Zealand and the United Kingdom -- countries that share intelligence with one another frequently.

"To overcome their shortcomings, China's People's Liberation Army (PLA) has been aggressively recruiting Western military talent to train their aviators, using private firms around the globe that conceal their PLA ties and offer recruits exorbitant salaries," Michael Casey, the director of ODNI's National Counterintelligence and Security Center, said in a statement. "Recent actions by Western governments have impacted these operations, but PLA recruitment efforts continue to evolve in response."

Private companies located in South Africa and China are working to hire former fighter pilots from a variety of Western nations in hopes of gaining insight into their methods and skills, and then pass it along to the PLA air force and navy pilots, the bulletin said.

"The PLA wants the skills and expertise of these individuals to make its own military air operations more capable while gaining insight into Western air tactics, techniques and procedures," the bulletin reads.

The most targeted jobs have been military pilots, flight engineers and air operations center personnel.

U.S. officials have responded by putting commercial restrictions on several companies, namely the Test Flying Academy of South Africa (TFASA), Beijing China Aviation Technology Co. (BCAT), Stratos and others. There have also been additional legal and regulation updates outlawing former military members from engaging in employment with China after they leave the ranks.

There have been warnings in recent months about the People's Liberation Army targeting veterans at professional events, on professional social networking sites, and through other

avenues.

In September, an Air Force official told Military.com at an Air and Space Forces Association conference in Maryland that "hundreds" of service members and allies are likely being targeted by the efforts.

An Air Force news release at that time warned veterans to be skeptical of "seemingly innocuous business deals or tech partnerships" that could "gradually pull them into covert activities that serve the interests of the Chinese government."

"These opportunities may be advertised on typical job listings or professional networking sites, such as LinkedIn or Indeed, and targeted head-hunting emails are being sent directly to the inboxes of individuals with desired skill sets," the Air Force said at that time.

Those who are contacted for such jobs are encouraged to reach out to their service branches' investigative office or the Federal Bureau of Investigation.

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Space

IN-SPACe Releases Guidelines for Implementation of Indian Space Policy 2023

04 May 2024

Source: The Hindu | https://www.thehindu.com/news/cities/bangalore/in-space-releases-guidelines-for-implementation-of-indian-space-policy-2023/article68135603.ece

Indian National Space Promotion and Authorization Centre (IN-SPACe) has released the norms, guidelines and procedures (NGP) for implementation of Indian Space Policy, 2023, in respect of authorisation of space activities.

The NGP would complement government endeavour in providing a predictable regulatory regime, transparency and ease of doing business in the Indian space sector.

Specific Criteria

“The NGP document lists space activities which need authorization from IN-SPACe, specifies criteria for granting such authorizations and provides necessary guidelines/pre-requisites to be fulfilled by an applicant for making authorization application to IN-SPACe,” IN-SPACe said.

The document states that any entity carrying out space activities to or from Indian territory or within the jurisdiction of India including the area to the limit of its exclusive economic zone needs authorization from IN-SPACe.

With regard to establishment and operation

of the ground systems the authorization from IN-SPACe shall be required for establishment and operations of satellite control centre, telemetry, tracking and command, mission control centre, remote sensing data reception station, ground stations for supporting operations of the space-based services such as space situational awareness, astronomical, space science or navigation missions, etc.

As Part of Reform

IN-SPACe was constituted in October 2021 as part of the far-reaching reforms in the space sector brought out by the Government of India, aiming towards boosting private sector participation in the entire range of space activities. IN-SPACe was created with a mandate to regulate and authorize all space activities undertaken by the Government entities and Non-Government Entities (NGEs), along with its role as a promoter, enabler and supervisor for the NGEs engaged in the space activities in the country.

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Russia Feared to be 'Inspecting' US Spy Satellite with New Space Weapon

Bhaswar Kumar | 22 May 2024

Source: Business Standard | https://www.business-standard.com/external-affairs-defence-security/news/russia-feared-to-be-inspecting-us-spy-satellite-with-new-space-weapon-124052200463_1.html

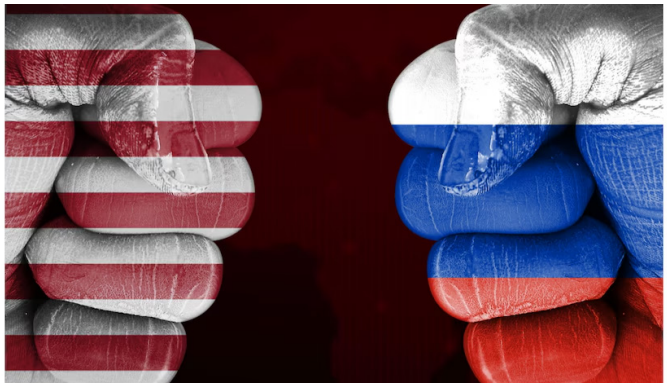

Photo: Shutterstock

Russia last week reportedly launched its Cosmos 2576 'inspector' satellite in the path of an American spy satellite, with the US intelligence assessment being that the Russian spacecraft is a weapon capable of inspecting and attacking other satellites.

The launch of the alleged Russian space weapon was announced by the US Space Command on Tuesday and reported by Reuters.

At present, the Russian spacecraft is trailing an American spy satellite in orbit, according to the news agency.

The report said that a Russian Soyuz rocket, which took off on May 16, deployed at least nine satellites, including the Cosmos 2576, in low-Earth orbit. The Cosmos 2576 is described as a type of a Russian military "inspector" spacecraft, which US officials have said have exhibited reckless space behaviour in the past.

In a statement to Reuters, a USSPACECOM spokesperson said that the US has observed the spacecraft's activity, arriving at the assessment that it is likely a "counter-space weapon presumably capable of attacking other satellites in low Earth orbit". The spokesperson added that Russia has deployed this new counter-space weapon "into the same orbit as a US government satellite".

Cosmos 2576 resembles other counter-space payloads deployed by Russia from 2019 and 2022, the spokesperson's statement went on to say, referring to a tactic used by Russia previously -- deploying its satellites close to sensitive American spy satellites.

The May 16 Russian space launch also included civilian satellites, which were deployed to different orbits. An analyst tracking the Russian space programme told the news agency that Russia mixing its military and civilian payloads together "was totally unexpected". The analyst added: "Never seen that before on a Russian launch."

As of Tuesday, Cosmos 2576 had not gone near a US satellite, said the report. However, it added that space analysts had observed that the Russian satellite was in the same orbital ring as USA 314, a National Reconnaissance Office (NRO) satellite launched in 2021. The NRO is a US intelligence agency overseeing the country's spy satellites.

Cosmos 2576 appears to be trailing this American satellite's orbital path at a faster speed, which could mean that the two spacecrafts will eventually come into closer proximity, the news agency found after reviewing public data available with the US Space Command.

Cosmos 2576 also appears to be similar to Russian satellites launched in 2019 and 2022. The US has claimed that those satellites were also counter-space weapons. According to the agency report, the Russian satellite launched in 2019 ejected an object into space and then closely followed an NRO satellite.

The deployment of Cosmos 2576 comes amid US allegations that Russia is developing a space-based nuclear weapon that will be capable of destroying entire satellite networks.

According to the agency report, American officials believe that Russia has already launched at least one satellite, called the Cosmos 2553, in relation to its nuclear space weapon programme.

However, US officials say that Russia has not deployed an actual nuclear weapon in space yet, added the report. The US and Russia have also been locking horns at the United Nations Security Council over satellite weapons.

For its part, since invading Ukraine in February 2022, Russia has threatened to attack American satellites aiding Ukraine's military, such as SpaceX’s Starlink network.

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Chinese Firm Files Plans for 10,000-Satellite Constellation

Andrew Jones | 27 May 2024

Source: Space News | https://spacenews.com/chinese-firm-files-plans-for-10000-satellite-constellation/

The third Zhuque-2 rocket lifts off from Jiuquan spaceport on Dec. 8, 2023. Credit: Landspace

HELSINKI — A Chinese firm linked to commercial rocket maker Landspace has filed a notification with the ITU for a constellation comprising 10,000 satellites.

Shanghai Lanjian Hongqing Technology Company, also known as Hongqing Technology, filed an Advance Publication Information (API) with the International Telecommunication Union (ITU) May 24.

The filing outlines plans for a constellation named Honghu-3. It is to total 10,000 satellites across 160 orbital planes.

The API filing notifies the ITU and member states about its intention to launch a satellite network or system. Others can then review the proposed satellite network to assess any potential interference with their existing or planned satellite systems.

The Honghu constellation plan appears to be the third 10,000-plus satellite megaconstellation planned by Chinese entities. It follows the national Guowang plan and the Shanghai-backed G60 Starlink proposal, both of which have been approved by China's National Development and Reform Commission (NDRC). First batches of satellites for the pair are expected to launch in the coming months.

The development will likely renew concerns over crowding, collisions and debris in low Earth orbit. Presently, SpaceX's Starlink is the largest operational constellation with over 5,000 operational satellites and plans for up to 42,000 spacecraft in orbit.

Honghu constellation background

Hongqing Technology, founded in 2017, has Beijing-based Landspace holding a 48% stake. The Shanghai-based company was initially recognized for developing Hall thruster propulsion technology. The company is building a satellite manufacturing facility in Wuxi City, Jiangsu province, close to Shanghai. The funding source for Hongqing Technology's plans was unclear at time of publishing.

The company's Jinwu-200 (JW-200) krypton propellant Hall effect thruster was tested on the Honghu-2 satellite launched by a Landspace Zhuque-2 rocket in December last year. The satellite was developed jointly with small satellite maker Spacety.

Hongqing Technology is based in Shanghai's Songjiang District and is involved in plans to develop satellite Internet in the area, where G60 Starlink is also located. G60 Starlink has submitted separate filings for its constellation plans.

The developments are linked to Shanghai's action plan to foster a commercial space ecosystem. This is likewise part of China's national strategy to build a world-leading satellite Internet system and comprehensive space power.

China has previously announced a national plan for a space-ground integrated information network, or SGIIN. This seeks to create an integrated system which combines communications, remote sensing, navigation, weather and other satellite capabilities.

Landspace meanwhile is developing a stainless steel, reusable methane-liquid oxygen launcher named Zhuque-3. The 4.5-meter-diameter rocket is to be capable of carrying 21,000 kilograms to low Earth orbit when expendable. It is slated for a first launch in 2025. The company has already conducted first vertical takeoff, vertical landing (VTVL) hop tests.

Landspace, like fellow commercial Chinese rocket startups Space Pioneer, Galactic Energy, iSpace and others, plan to launch satellites for China's planned megaconstellations.

China is currently building a commercial spaceport near Wenchang to help ease a bottleneck in access to launch pads. This will be required to allow China to boost its launch rate to build its megaconstellations.

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China's Military Satellites are Watching America's Every Move

Aadil Brar | 08 May 2024

Source: News Week | https://www.newsweek.com/china-military-satellites-space-tracking-conflict-1898177

A Long March 3B rocket carrying the Beidou-3GEO3 satellite lifts off from China on June 23, 2020. China is challenging the U.S. monopoly on satellite tracking capability, a senior Space Force official said. STR/AFP VIA GETTY IMAGES

China is fast challenging the United States' monopoly in space as new remote-sensing satellites have allowed Beijing to monitor American military assets globally.

"The PLA has rapidly advanced in space in a way that few people can really appreciate," Major General Gregory J. Gagnon, the Space Force's deputy chief of space operations for intelligence, said at the Mitchell Institute for Aerospace Studies on May 2.

The Space Force, established by former President Donald Trump, faces challenges posed by China's rapidly transforming space capabilities.

Space has emerged as a contested domain integral to modern military operations, as countries have sought to track each other's military assets from space. Military strategists believe satellites and space-based weapons could be used to fire the first shot in future conflicts. Satellites could be used to jam an opponent's signals during an escalation of military tensions.

China established its version of the Space Force in 2015, which was placed under the hierarchy of the People's Liberation Army's Strategic Support Force (SSF). Chinese President Xi Jinping dissolved the SSF last month, and a new force called the Information Support Force was constituted to merge the SSF's existing remit with it.

China has added over 400 satellites in the past two years, from which more than half have the capability to track objects on Earth, Gagnon said at the Mitchell Institute.

"They will now—in a way that we're not comfortable talking about in America—they will be inside a rapidly expanding weapons engagement zone," Gagnon added.

Gagnon explained that China can now track U.S. military assets even when they are mobile, challenging U.S. monopoly on long-range targeting. The data collected by China's satellites can provide a precise location of military vessels on the move at sea, making their subsequent targeting during conflict easier, according to Gagnon.

Newsweek reached out to the Chinese Foreign Ministry, the U.S. Space Force and the U.S. State Department for comment via email.

This isn't the first time a senior U.S. Space Force official has warned about China's growing space capability.

General Bradley Saltzman, Chief of Space Operations at the U.S. Space Force, recently raised an alarm about China's exponential growth in satellite-based surveillance capability.

"The PRC has more than 470 [intelligence, surveillance, and reconnaissance] satellites feeding a robust sensor-shooter kill web," Saltzman said in March at the Mitchell Institute's Spacepower Security Forum, according to Air & Space Forces Magazine.

The rapidly declining cost of satellite launches has also spurred a revolution in China's private satellite companies launching new satellites. Chinese companies can now share near-accurate satellite imagery of U.S. military assets on land and at sea.

In 2023, Chinese companies launched 120 commercial satellites, which made up 54 percent of all satellites sent into orbit last year, according to China's state-run news agency Xinhua.

Mino Space, a Beijing-based satellite company, recently published the images of the U.S. Norfolk Naval Base captured with its Taijing 4-03 satellite. Mino Space has emerged as

a leading Chinese satellite imagery provider that occasionally showcases its satellite capability by publishing the latest visuals of U.S. military bases and assets.

Mizar Vision, a Chinese satellite imagery provider launched in 2021, has been sharing daily satellite imagery of the military assets participating in the U.S.-Philippines joint exercise, Balikatan, over the past weeks on X-like Chinese social media platform Weibo.

Mizar is closely tracking the movements of the USS Theodore Roosevelt aircraft carrier, currently deployed in the South China Sea for joint exercises with the Philippines. It has also shared imagery of military activity around Taiwan and Japan over the past weeks.

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New Details Emerge of Russia's Potential Nuclear Space Weapon

Theresa Hitchens | 03 May 2024

Source: Breaking Defense | https://breakingdefense.com/2024/05/new-details-emerge-of-russias-potential-nuclear-space-weapon/

A view of the U.S. Starfish Prime high-altitude nuclear test taken at Maui Station in Hawaii on July 9. 1962. A view of the U.S. Starfish Prime high-altitude nuclear test taken at Maui Station in Hawaii on July 9. 1962. (Los Alamos National Laboratory)

WASHINGTON — The Biden administration is taking to the bully pulpit to voice its conviction that Russia is moving to put a nuclear weapon in space designed to destroy satellites — with a senior State Department official for the first time today explaining that the concern is centered on a specific satellite development Moscow claims is aimed at testing electronics.

"The United States is extremely concerned that Russia may be considering the incorporation of nuclear weapons into its counterspace programs, based on information deemed credible," Mallory Stewart, assistant secretary for the Bureau of Arms Control, Deterrence, and Stability, told the Center for Strategic and International Studies (CSIS).

"The United States has been aware of Russia's pursuit of this sort of capability dating

back years, but only recently have we been able to make a more precise assessment of their progress. Russia has publicly claimed that their satellite is for scientific purposes," she said.

"However, the orbit is in a region not used by any other spacecraft — that in itself was somewhat unusual. And the orbit is in a region of higher radiation than normal lower Earth orbits, but not high enough of a radiation environment to allow accelerated testing of electronics as Russia has described the purpose to be," Stewart elaborated.

Like other Biden administration officials before her, Stewart rushed to assure listeners that this "is not an active capability that has already been deployed. Although Russia's pursuit of this capability is deeply troubling, there's no imminent threat."

And similarly to those officials, she would not characterize the potential timeframe in which Moscow might be able to deploy that capability.

Russia's April 24 veto of a UN Security Council resolution to reaffirm the 1967 Outer Space Treaty's bar on weapons of mass destruction (WMD) in space crafted by the US and Japan seemly has set the Biden administration free with its criticism of the alleged plan. (Russian President Vladimir Putin has issued a blanket denial of any such intent.)

The US-Japan resolution marked the first time the issue of outer space security has been put before the UNSC — although debate has been ongoing for decades in other UN bodies.

White House National Security Advisor Jake Sullivan on April 25 issued a statement confirming the Biden administration's belief that Russia is pursuing a nuclear ASAT, and raising questions about Moscow's rationale for its veto.

And on May 1, Assistant Secretary of Defense for Space Policy John Plumb in written testimony to the House Armed Services Committee doubled down on the accusation, which in fact was first leaked by Rep. Mike Turner, R-Ohio, the chair of the House Intelligence Committee.

"Russia is also developing a concerning anti-satellite capability related to a new satellite carrying a nuclear device that Russia is developing. This capability could pose a threat to all satellites operated by countries and companies around the globe, as well as to the vital communications, scientific, meteorological, agricultural, commercial, and national security services we all depend upon," Plumb wrote.

Stewart echoed Plumb's statements at the HASC hearing that while the effects of a nuclear blast in space would depend on a number of factors — including the precise orbit of the detonation and the size of the bomb — there could be long-standing damage down to the global space commons from such a weapon.

"Our analysts assess that detonation in a particular placement in orbit of a magnitude and location would render lower Earth orbit unusable for a certain amount of time," she told CSIS.

Nuclear weapons have been detonated in space before, by both the Soviet Union and the US during the early days of the Cold War. The largest was done by the US in 1962: After a series of failed tests, the United States conducted

the Starfish Prime experiment, setting off a 1.45 megaton nuke at an altitude of about 450 kilometers (about 280 miles) above sea level.

The blast created an electro-magnetic pulse and lingering radiation belts that ultimately killed eight of the 24 satellites that were then on orbit, including one owned by the United Kingdom, according to a 2022 report by the American Physical Society.

Victoria Samson, director of the Secure World Foundation's Washington Office, said that much remains unclear even as small details are being put out in dribs and drabs.

"There are still a lot of unanswered questions and that is probably due to the fact that so much of this depends on intel-gathering or is still amorphous. One thing that seems to be clear is that the US seems to think that the weapon (and it is clearly thought to be a WMD) would be placed on LEO," she told Breaking Defense.

Stewart said that the US government is continuing to press the issue at the United Nations and other international forums. Most immediately, she noted, Russia's Security Council veto will be discussed in the UN General Assembly on May 6 — a forum open to all UN member nations.

Samson explained that the May 6 meeting "will be a veto initiative debate on the vetoed US/Japan resolution" — based on an April 2023 UN resolution that allows such a debate 10 days after a veto. That resolution, she explained, "tracks back to concerns last year that the UNSC veto was being unfairly wielded."

Further, Stewart said, the Biden administration is "continuing to engage bilaterally and multilaterally and to use all the diplomatic tools in the context … of the CD — the Conference on Disarmament — the UN First Committee and other diplomatic forums in which these exact issues are being discussed. So, we hope to continue to have these conversations there."

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Global Aerospace Industry

Israel to Add 25 more F-35s Under Latest $3bn Deal

Ryan Finnerty | 05 June 2023

Source: Flight Global | https://www.flightglobal.com/fixed-wing/israel-to-add-25-more-f-35s-under-latest-3bn-deal/158635.article

Source: Israeli Ministry of Defense

The Israeli air force currently operates two combat squadrons of the F-35I "Adir", an Israel-specific version of the conventional take-off and landing A-model variant

Officials from Israel and the USA have reached an agreement that will see the Middle Eastern country purchase additional Lockheed Martin F-35 fighters.

Israel will add 25 aircraft to its existing F-35 fleet under the latest $3 billion deal, bringing its total inventory to 75 fighters. The agreement

was inked in Washington DC this week, where senior officials from the Israeli defence ministry, the Pentagon, US state department and the White House met.

"The Israeli Ministry of Defense has signed an agreement with the US government for the third squadron of the "Adir" (F-35) aircraft, which will be integrated into the Israel Defense Forces," Tel Aviv said on 4 June.

The Israeli air force (IAF) currently operates two squadrons of specially configured F-35As, designated locally as the F-35I Adir. Cirium data suggests the country currently has 39 of the jets in service, six more on order and options for an additional five examples. Those figures do not include the latest order.

Delivery of the first tranche of Israel's new fighters is expected in 2028.

Lockheed says only that it is "pleased" by the Israeli government's decision to acquire more aircraft.

A supplemental Israeli F-35 order had been discussed as far back as 2017, when the IAF declared initial operational capability on its first examples of the single-engined stealth fighter.

Israel firmed up those plans in 2023, when the defence ministry stated its intent to acquire 25 more aircraft. However, domestic political wrangling over funding, as well as negotiations with US officials over the terms of the export deal, had held up a formal agreement until now.

In 2023, the Israeli defence ministry said Lockheed and F-35 propulsion supplier Pratt & Whitney had already committed to "involving Israeli defence industries" in the production of aircraft components on the IAF jets.

The Pentagon has an ongoing halt on new F-35 deliveries, while prime contractor Lockheed works to certify a new technical configuration of the jet known as TR-3. That package includes a new flight computer and updated operating software.

Although that system continues to face unsolved technical issues, Lockheed says its preparing a scaled down version that could be approved for use in the coming weeks, with deliveries resuming shortly thereafter.

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Inversion Space Targets Military Market with 'Warehouses in Space'

Sandra Erwin | 16 May 2024

Source: Space News | https://spacenews.com/inversion-space-targets-military-market-with-warehouses-in-space/

Inversion Space's demonstration reentry capsule is scheduled to launch in October 2024 on the SpaceX Transporter-12 rideshare. Credit: Inversion Space

WASHINGTON — Inversion Space, a startup founded in 2021, is setting its sights on revolutionizing military logistics with its

concept of "warehouses in space." The company envisions deploying reusable reentry capsules to store cargo in orbit, and delivering it to any point on Earth within an hour.

A pathfinder mission dubbed "Ray" is scheduled for launch as early as October on the SpaceX Transporter-12 rideshare mission. Funded by Inversion's $10 million seed round, Ray will test technologies that will support the development of a larger capsule, according to co-founder and CEO Justin Fiaschetti.

Inversion envisions itself as a "warehousing and transportation company," Fiaschetti told SpaceNews. "We would store cargo in space, and when it's needed, deliver it in under an hour," he said. The capsules could transport anything from medical supplies and battlefield gear to small surveillance drones.

DoD wants Speed and Autonomy

"Militaries are always in need of fast, precise cargo delivery across the globe," Fiaschetti said, highlighting the reason why the company sees the Defense Department as its main customer. Following successful deployment with military clients, Inversion expects costs to decrease, enabling commercialization for sectors like private aviation and cruise lines.

While Fiaschetti declined to disclose specific customers, the U.S. Air Force is a clear potential adopter. "Close communication with potential customers has been crucial," he said. "We understand what cargo they need and what matters most — speed and autonomy." Autonomy is key to ensure precise landings even at updated locations mid-flight, said Fiaschetti.

Inversion is designing its capsule to be interoperable with any commercial launch vehicle, with load capacity details still under wraps.

Even though the company is developing a product for military use, Inversion did not seek government funds for development, Fiaschetti said.

"We don't see any risk of adoption. We don't see any risk that customers will not want this," he said, framing the key challenge as one of execution rather than generating interest.

"Building the product, getting it to scale production, bringing the cost down and flying regularly and reliably for our customers — that's the execution," Fiaschetti said.

Upcoming Test Mission

For the upcoming Ray mission, the compact capsule will remain in orbit for several weeks while undergoing checkouts before initiating a deorbit burn with an onboard rocket engine.

If all goes as planned, it will reenter the atmosphere at hypersonic speeds while deploying a pair of parachutes — that Inversion developed in-house — to gently splash down off the California coast.

The flight is meant to validate critical reentry technologies ahead of constructing Inversion's larger cargo vehicle, the specifications of which are not yet being disclosed.

The 25-employee startup believes its vision of orbital warehouses and rapid delivery has

a viable future. "People are already spending money on transportation," Fiaschetti said. "Let's give them a better way to do it."

Fiaschetti is a former SpaceX and Relativity Space propulsion engineer. Inversion's co-founder and chief technology officer Austin Briggs was a propulsion engineer at ABL Space Systems.

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Space-Based Monitoring of Electronic Signals is now a Commercial Battleground

Sandra Erwin | 03 June 2024

Source: Space News | https://spacenews.com/space-based-electronic-eavesdropping-becomes-commercial-battleground/

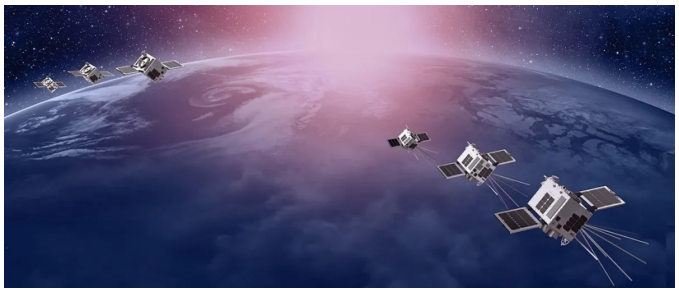

Illustration of HawkEye 360's Cluster 9 satellites

Credit: HawkEye 360

WASHINGTON — The once highly-classified ability to detect and pinpoint the locations of radio frequency (RF) emissions from space is rapidly transitioning to the commercial sector — giving companies new powerful capabilities for all sorts of surveillance and intelligence gathering.

Interest in RF monitoring from space has soared in recent years as geopolitical conflicts disrupt vital maritime shipping lanes and supply chains, underscoring vulnerabilities.

Companies like Virginia-based HawkEye 360 are leveraging shoebox-size satellites that hear electronic signals — emitted by ships, aircraft and other sources — to provide intelligence on "dark ships" evading detection and the location of GPS jammers in Ukraine. And the technology's potential is only just starting to be realized, said James "Sandy" Winnefeld, a retired U.S. Navy admiral and a board member of HawkEye 360.

"We're only scratching the surface of what's possible," he said in an interview.

RF data helps track vessels even if they shut off their Automatic Identification System (AIS) — a common tactic for illegal fishing or smuggling. Using data from other emitters such as ship radar, said Winnefeld, it's possible to create an electronic "fingerprint" of that vessel so it can be identified even when the AIS is turned off or spoofed.

More Applications

While the maritime environment has been the primary focus for commercial RF sensing companies, a new frontier is emerging on land as the proliferation of GPS, communications devices and other emitters generates a deluge of exploitable signals intelligence.

From smartphones and internet-of-things devices to vehicular communications systems and more, all of that data has intelligence value if it can be captured and analyzed, said Winnefeld.

"You're going to see more RF processing capability, more frequency coverage, more sensitivity," he said. A technical challenge remains in geolocating "very intermittent, hard

to find land-based radars. That's a much harder challenge, and an area where we're going to work very hard in the future."

Countries in different parts of the world are creating new demands for RF monitoring, said Winnefeld. "Everyone has different needs."

In April, HawkEye 360's constellation grew to 29 satellites after launching two triplets into mid-inclination orbits optimized for monitoring busy shipping lanes. Later this year it plans to deploy two more clusters of three spacecraft and test launch a new payload designed to collect more advanced signals intelligence.

Emerging Competitors

As space-based RF sensing transitions from being a closely guarded capability of government and military programs to a commercial industry, U.S. firms like HawkEye 360 face growing international competition. Emerging players, notably in Europe, are capitalizing on democratized access to space, sensors and AI technologies.

Startups like Aerospacelab and Unseenlabs have recently unveiled plans to field advanced radio frequency monitoring satellites and data products over the coming years.

Belgium's AerospaceLab in March launched its first trio of satellites equipped with RF sensing payloads that, like HawkEye 360's, fly in a triangular formation. In a white paper published last month, the company touted its ability to characterize and locate unique RF emissions of ground-based radar systems.

French startup Unseenlabs, meanwhile, announced plans to expand its RF tracking satellite network beyond its core maritime business with a new generation of satellites capable of tracking emissions from land, air and space-based sources.

The company aims to grow its constellation to around 20 satellites in the next few years. Unseenlabs geolocates RF signals using individual satellites rather than orbital clusters like its competitors.

Radar Imaging

Commercial providers of RF monitoring data are also facing growing competition from synthetic aperture radar (SAR) satellite operators rolling out their own maritime intelligence offerings.

Firms like Capella Space, Iceye and others are introducing new services for maritime domain awareness that promise to detect and identify dark vessels attempting to mask their locations.

While different types of space-based sensors are often viewed as competitors vying for the same customer dollars, Winnefeld said compelling intelligence emerges when disparate data sources are fused into integrated solutions.

Phenomenologies work best in a complementary fashion, he said. A prime example is the increasingly common "tipping and cueing" approach, where a satellite detecting a suspect RF emission from a vessel "tips" or cues another satellite with different sensing capabilities to take a closer look and capture high-resolution imagery.

This type of data fusion is already occurring in U.S. military and intelligence programs where a prime contractor is hired to integrate data streams from multiple commercial remote sensing providers into unified situational awareness solutions.

As the space-based electronic intelligence market expands, said Winnefeld, one obstacle for commercial firms is lack of awareness among potential government customers about the availability and capabilities of commercial services. Defense budgets and procurement processes that favor existing programs can also hinder adoption, he said.

"The military sometimes doesn't have great visibility into what's out there from the commercial sector," Winnefeld said. He suggested companies offer pilot programs to defense organizations at little or no cost to showcase their electronic signals-tracking abilities.

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Taiwan Boosts F-16 Fleet with $220m US Support Package

Harry McNeil | 06 June 2024

Source: Airforce Technology | https://www.airforce-technology.com/news/taiwan-boosts-f-16-fleet-with-220m-us-support-package/

The deal shows the US commitment to maintaining military balance and political stability in a region marked by rising tensions. Source: ChenHao_Kuo/ Shutterstock

To bolster Taiwan's defence readiness, the US State Department has approved a potential $220m (T$7.1bn) sale of F-16 spare and repair parts to the Taipei Economic and Cultural Representative Office (TECRO) in the United States.

The deal shows the US commitment to maintaining military balance and political stability in a region marked by rising tensions.

The threat of a Chinese invasion of Taiwan is currently a concern for the US, as highlighted by GlobalData's intelligence on the US defence market.

Taiwan's Defence Strategy Strengthened by US Support

The approval follows recent developments from Taiwan to enhance its F-16 fleet. In 2024, they stocked their offensive capabilities by

acquiring 50 Joint Standoff Weapon (JSOW) air-to-surface missiles (AGM-154 Block III C) valued at $68.4m. In 2023, the US government approved a $500m Foreign Military Sales agreement to supply Taiwan with infrared search and track (IRST) technology for its F-16 Fighting Falcon jets.

Former US President Donald Trump approved a major FMS deal of 66 F-16 Block 70 fighter jets worth $8bn in August 2019. Taiwan's armed forces are expected to operate 208 F-16s by 2026, according to GlobalData's "Taiwan Defense Market 2023-2028" report.

The State Department's recent approval of a potential $220m Foreign Military Sale to Taiwan's TECRO highlights an ongoing commitment to fortifying Taiwan's defence capabilities. This deal, centred on standard spare and repair parts for F-16 aircraft, is designed to enhance Taiwan's operational readiness and long-term defence strategy.

The approved sale will provide Taiwan with essential spare and repair parts, components, consumables, and accessories for its fleet of F-16 aircraft. This package includes engineering, technical, and logistics support services from US government and contractor sources. The support aims to ensure Taiwan's air force can meet current and future threats.

Ensuring Regional Stability

The US Navy has made headlines with its recent transits through the Taiwan Strait and the South China Sea, stirring tensions and drawing sharp reactions from China. The USS Halsey conducted a Freedom of Navigation operation through the Taiwan Strait on May 14, 2024, challenging China's territorial claims and prompting criticism from the Chinese government.

Similarly, a US Navy P-8A Poseidon's transit through the Taiwan Strait on April 17, 2024, signalled a commitment to upholding navigational rights and maintaining a free and open Indo-Pacific amid escalating geopolitical rivalries.

Notably, the equipment for this sale will be sourced from existing US Air Force stock. Additionally, implementing this sale will not necessitate deploying additional US government or contractor personnel to Taiwan.

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Indian Aerospace Industry

Indian Air Force Draws up a Roadmap to Outsource Overhaul of 60 AN-32 Aircraft to the Industry

Vijay Mohan | 10 May 2024

Source: Tribune India | https://www.tribuneindia.com/news/india/indian-air-force-draws-up-roadmap-to-outsource-overhaul-of-60-an-32-aircraft-to-the-industry-619923

Procured from the erstwhile Soviet Union, the twin-engine AN-32 turboprop began entering Indian service in 1984

The Indian Air Force (IAF) has drawn up a roadmap to outsource part of the repair and overhaul of airframes along with certain components of the Soviet-origin AN-32 tactical transport aircraft to the industry.

The IAF is seeking proposals from the industry, including original equipment manufacturers and joint venture firms for overhaul processes as well as carrying out studies for technical life extension of the airframes and components beyond 40 years.

Outsourcing is expected to commence this year. The IAF's defined requirement is to overhaul 60 AN-32 aircraft by the end of 2028-29 fiscal, with the average output being 15 aircraft per overhaul cycle.

The AN-32 overhaul process includes a total of 11 stages, out of which five would be outsourced to the industry, air force sources said. These include disassembly of sub-systems and components, cleaning and paint removal, structural repair and refurbishment, re-assembly of sub-systems and final painting.

The work would be carried out at No. 1 Base Repair Depot (BRD) at Kanpur. While this depot is responsible for the repair and overhaul of AN-32 airframe and other components, the engines of these aircraft are overhauled at No. 3 BRD in Chandigarh.

The IAF will provide the physical infrastructure, including work space and hangars, overhaul technology, training, specialised tools and test rigs, while the industrial partner will be responsible for provisioning manpower, general tools, spares and aggregates and ensuring safety protocols.

Procured from the erstwhile Soviet Union, the twin-engine AN-32 turboprop began entering Indian service in 1984. A total of 125 aircraft were bought, out of which over 100 are said to be in service. These are heavily used for crucial air maintenance in northern and north-eastern sectors, besides performing other tasks such as tactical airlift, communication, para-troop training and disaster management.

In 2009, a deal with Ukraine was finalised to upgrade the entire fleet, which included total technical life extension, repowering the engines, certain structural modifications to reduce weight, noise and vibrations, installation of a glass cockpit with a new avionics suite and flight management system, satellite navigation system and anti-collision systems.

Some aircraft were modified in Ukraine, while the remaining fleet was to be modified in India by No. 1 BRD. Defence Minister Rajnath Singh said in the Parliament recently that half the AN-32 fleet had been upgraded.

With the ongoing Russia-Ukraine conflict, as well as other geo-political developments affecting the supply of spares for Russian-origin military platforms, the IAF is laying greater impetus on the indigenous route for ensuring serviceability of its equipment.

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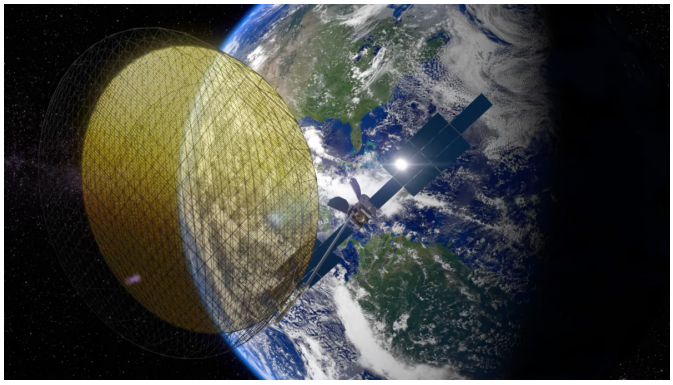
India Enters a Troubled Space Insurance Market

Jason Rainbow | 17 May 2024

Source: Space News | https://spacenews.com/india-enters-troubled-space-insurance-market/



A rendering of a ViaSat-3 satellite, the first of which launched April 30, 2023 on a SpaceX Falcon Heavy and suffered an issue post launch that prevented the deployment of the broadband satellite's large reflector antenna. Credit: Viasat

TAMPA, Fla. — Indian insurance specialist Tata AIG is expanding into space as the global market reels from a string of heavy losses.

Tata AIG said May 13 it has started providing satellite in-orbit third-party liability insurance covering bodily injury and property damage, building on the 22-year-old company's expertise in the aviation market.

Sushant Sarin, president of commercial business at Tata AIG, a joint venture between Indian conglomerate Tata Group and U.S.-based insurance firm American International Group (AIG) with more than 8,750 employees, said it is the first private insurer in India to offer satellite-based coverage.

"This innovative product caters to the growing needs of satellite manufacturers and operators in the Indian space sector, especially in the wake of recent solar storm that highlights the potential

hazards faced by orbiting spacecraft," Sarin said.

"We are confident that this will empower Indian satellite companies to operate with greater confidence and contribute to the nation's spacefaring ambitions."

Deepak Kumar, senior executive vice president, said Tata AIG will work with reinsurers internationally to offload risk.

Tata AIG plans to later provide first-party property damage coverage for satellite and launch vehicles during pre-launch, launch, and in-orbit operations.

There are around 189 startups in India developing space-related businesses, according to Kumar, who is also head of reinsurance, credit and aviation insurance at the group.

"These new entrants in space economy are seeking financial risk mitigation tools to ensure sustainability of their operations," he said via email.

"Tata AIG would be a natural partner to such startup companies."

Turbulent Times

Around $2 billion space insurance claims have been reported over the last 12 months across 20 incidents, according to Dubai-based underwriter Elseco, nearly 10% of the estimated $23 billion value of all insured assets in orbit.

Most of these events occurred in 2023, a harrowing year for the market that has raised questions about its capacity to cover future risks.

The failure of Viasat-3 and power issues affecting the first four SES O3b mPower satellites are among the most high-profile claims.

Insurance rates jumped as much as 100% for some space risks in the last three months of 2023 compared with the same period in 2022, Elseco chair and CEO Laurent Lemaire said.

Lemaire said rates continue to soar as roughly $1 billion in claims have come through since the start of this year.

Still, he said rates remain around 37% lower than in late 2002 after declining over the last few decades.

Tata AIG's Kumar said: "While there have been few large losses in this segment, the Space Insurance market will work together to ensure continuity of coverages."

Increasing space activity also increases demand for insurance, he added, bringing in more income and making the market more sustainable.

He pointed to how India has been relaxing foreign investment rules among other measures to seek a larger share of the global space economy, currently estimated at around 2%.

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India Eyes 50,000 Cr. Defense Exports By 2028-29; Modi's Make-In-India Magic Turning It Around For Delhi

Air Marshal Anil Chopra (retd) | 04 May 2024

Source: Eurasian Times | https://www.eurasiantimes.com/india-eyes-50000-cr-defense-exports-by/

Photo: Courtesy of Hubei Sanjiang Group, CASIC Su-30MKI firing the BrahMos-A missile (via Platform X)

Amidst India's defense exports crossed ₹21,000 crores, approximately $2.7 billion, for the first time, Defence Minister Rajnath Singh announced on April 01. It was a spectacular growth of 32.5% over the previous fiscal.

The Minister added that defense exports have grown 31 times in the past ten years compared to FY 2013-14. The growth reflected the global acceptability of Indian defense products and technologies.

The private sector and the DPSUs contributed about 60% and 40%, respectively. India's interim defense budget for 2024-25 was Rs 6,21,541 crore (approx $75 billion). Rs 1.72 lakh crore (27.67%) was for capital acquisition, 75% of which has to be spent on made-in-India capital purchases.

The ongoing conflict in Europe and West Asia has exposed defense production capacities, surge production capabilities and limitations, and supply chain dynamics. India remains among the top arms importers. Self-sufficiency in arms production has become highly desirable and a must for India if it has to sit on the global high table.

PM Modi-led Indian government had realized early and pushed "Atmanirbharta." Make-in-India derives the highest returns in defense production as the technologies are not easily shared. India has two nuclear-armed neighbors with both. India has somewhat hostile relations and has fought wars.

The need for modernizing security forces to tackle emerging threats can't be overemphasized. Increasing defense production requires a whole national approach.

Economic growth remains the starting point. India's foreign trade policy aims for significant growth by 2030. The export of dual-use goods and technologies is identified as a crucial driver.

India has been a very responsible member that strictly follows the non-proliferation norms. India must increase its R&D spending and seek partnerships with friendly foreign countries.

Whole Nation Approach

Credit for India's defense exports success must go to the Government of India (GoI) for driving and facilitating defense production and exports, and no less, to the around 50 major Indian public and private sector companies and hundreds of MSMEs who played a pivotal role.

It required considerable innovation and meeting global quality standards. The GoI has set up the Tech Development Fund and funding Innovation for Defence Excellence (IDEX).

Defense exports reached across geographical regions to countries such as Italy, Maldives, Sri Lanka, Russia, UAE, Poland, Philippines, Saudi Arabia, Armenia, Egypt, Israel, Spain, and Chile, among others.

Among the major defense items being exported or to be exported are choppers, missiles, aircraft avionics, offshore patrol vehicles, coastal surveillance systems, personal protective items, light engineering mechanical parts, and aircraft protection systems, among others.

Significant Armed Forces Interaction & Support

Indian armed forces are very actively supporting indigenization. Army Technology Board (ATB), Army Design Bureau (ADB), Naval Design Bureau, and IAF's Directorate of Indigenisation interface with the academia and industry for their requirements.

Service operational requirements and specifications are being jointly evolved and discussed with private players.

A few big private industrial houses are now well-established in aircraft defense manufacturing. Tata Aerospace and Defence have been making the combat helicopter fuselage for Boeing AH-64 Apache combat helicopter and aero-structures for Boeing's CH-47 Chinook helicopters.

All Lockheed C-130Js delivered to customers worldwide have major aero-structure components from India. Sikorsky, a Lockheed Martin company, also relies on Hyderabad-based Tata Advanced System Limited (TASL) to manufacture its global supply of cabins for the S-92 helicopter.

Tata Group is working with GE to manufacture CFM International LEAP engine components in India. Lockheed Martin selected TASL to produce F-16 wings in India.

Many private companies are making defense electronics, large aero components, advanced technology components, and sub-systems. Dynamatic Technologies makes assemblies of vertical fins for Sukhoi 30 MKI fighters.

They also supply aero-structures to Airbus for its A320 family of aircraft and the wide-body 330 aircraft. Hyderabad's VEM Technologies manufactures center fuselage for LCA Tejas. Many Indian MSMEs and start-ups are entering defense production.

Recent Foreign Orders For Indian Companies

The Philippines has begun receiving Indian-built BrahMos cruise missiles as part of the initial $375 million contract, India's largest defense export order ever.

Airbus awarded TASL a contract for aircraft cargo doors. Dynamatic Technologies signed a long-term contract with Dassault to manufacture and assemble Flight Critical Aerostructures for Falcon aircraft. They also secured a contract to build doors for Airbus A220 Aircraft.

Rolls-Royce signed a contract with Azad Engineering to make complex defense aero-engine components in India. Munitions India signed an agreement with Saudi Arabia for artillery ammunition. Indian firms have also signed deals with Armenia, which is looking to thwart Azeri aggression with the backing of Turkey.

Recent Domestic Orders

In April 2024, MoD issued ₹65,000 crore ($8.1 billion) tender to HAL for 97 Tejas Mark 1A fighter jets. Mazagon Dock Shipbuilders Ltd (MDL) will build 14 Fast Patrol Vessels for the Indian Coast Guard. Cochin Shipyard will make a hybrid wind farm service vessel.

MoD placed an order on BEL for 11 Shakti Electronic Warfare Systems for the Indian Navy. AWEIL got an order for 463 Stabilized Remote-Control Guns for the Indian Navy & Indian Coast Guard and will supply 30mm AK 630 Naval guns.

Digitronics is making DC-DC converters and EMI filters for the Tejas Mk1 aircraft. ARC Ventures got an Indian Army contract for robotic MULES. Paras Defence got an order for optronic periscopes. Jindal JSW group will manufacture and supply 96 Specialist Mobility Vehicles (SMVs) for the Indian Army. Zen Technologies got orders for tactical training simulators.

Recent Defence Investments in India

PM Modi inaugurated a new state-of-the-art Boeing India Engineering & Technology Center campus in Bengaluru. Israeli chipmaker Tower Semiconductor will set up a fabrication plant worth $8 billion in India. Kalyani Group plans to establish a titanium metal and aerospace components manufacturing facility in Odisha.

Recent Major DRDO Projects & Successes

DRDO recently tested the 155×52 ATAGS by installing it on BEML's lighter armored truck. Indian Army issued a request for information (RFI) in April 2021 to procure 354 locally manufactured light tanks for deployment in challenging terrain.

DRDO's Zorawar light tank is expected to be ready for user trials soon. L&T is likely to produce and supply 59 Zorawar light tanks.

ADE is developing a new MALE class UAV called the Archer-NG. The first flight is expected by mid-2024. India is all set to test the indigenous 500-km range submarine-launched cruise missile that will go on to the indigenous submarines under Project 75 (India) by the Indian Navy.

India recently demonstrated MIRV capability on Agni-V, which has a range of 5000 km.

DRDO is close to success in surface and airborne Directed Energy Weapons (DEW). DRDO is also at the advanced stage of indigenous AESA radar for Su-30MKI.

DRDO anti-drone technology is ready for production by BEL and the private sector. DRDO's DATRAN 1500 HP engine prototype for the DRDO's Futuristic Main Battle Tank (FMBT) is getting ready.

Major Defence Joint Ventures & Collaborations

Mahindra Defence and DRDO will jointly develop an 8×8 wheeled CBRN for the Indian Army. Bharat Forge and DRDO will jointly make indigenous 105mm guns. Paninian Aerospace & Defence has signed a strategic partnership with Godrej Aerospace to leverage their combined expertise to accelerate the design and development of Gas Turbine Engines for both aerospace and naval applications.

IIT Madras is partnering with Munitions India for indigenous 155mm smart ammunition. Jindal Advanced Materials (JAM) signed a MoU with the Tamil Nadu government to set up a new manufacturing plant in Trichy.

PTC Industries and HAL tied up for the indigenization of aviation components. Jindal Stainless signed an MoU with MSME Tech for manufacturing missiles & rocket launchers.

GRSE entered into a long-term agreement with Hindalco to procure high-quality aluminum plates and extrusions. Armament Research and Development Establishment (ARDE), Pune, supports Hyderabad-based Dvipa Armour India Private Limited (DAIPL), to develop an indigenous assault rifle named 'Ugram.'

Major Foreign Joint Ventures & Collaborations

Airbus and Tata Group are making a helicopter manufacturing hub in India. MDL and ATLA Japan look at undersea platforms and robotics collaboration. Garden Reach Shipbuilders & Engineers Ltd (GRSE) and Rolls Royce partnered for advanced marine engineering production.

MIDHANI offers critical materials needed for manufacturing aircraft engines and aerospace vehicles and will be a major supplier for US-based GE Aerospace manufacturing F414 fighter jet engines in India.

The recent INDUS-X Summit in New Delhi was meant to support strategic technology partnerships and defense industrial cooperation between India and the USA. India and France agreed to adopt the Defence Industrial Roadmap and explore opportunities for partnership in the defense industrial sector.

During Rajnath Singh's recent UK visit, there was a discussion on the 6th generation "TEMPEST" aircraft project. DRDO and the UK's Defence Science and Technology Laboratory (DSTL) will collaborate more in research and development. Germany and India want to foster closer defense partnerships, with a particular emphasis on defense technology.

Netherlands and India are looking to expand their bilateral defense cooperation, particularly in maritime and industrial domains, and Dutch OEMs could integrate Indian vendors into their supply chains.

India and South Korea are exploring cooperation in emerging technologies and semiconductors. Defence remains the most important collaboration with Brazil. Embraer and Mahindra have joined to offer the C-390 Millennium multi-mission aircraft to the IAF.

Oman is interested in working with India in shipbuilding & MRO. India and Greece have agreed to escalate their bilateral trade with defense as a priority area. Poland is looking forward to working with India to service Russian-built weapons like the T-90 and T-72 tanks. Italy and India recently elevated their bilateral relations to a strategic level.

Navantia, Spain's state-owned shipyard, has expressed interest in supplying the Indian Navy with the multi-purpose 26,000-ton LDP amphibious assault ship of the Juan Carlos I class on a Make-in-India basis and technology transfer.

India has supported a loan for Guyana to acquire two Indian-made Dornier Do-228 aircraft from Hindustan Aeronautics Limited (HAL).

Jeh Aerospace has opened a 160,000 sq. ft manufacturing hub in Hyderabad to provide manufacturing solutions to the aerospace and defense industry. It received $2.75 million in seed funding from Silicon Valley-based General Catalyst.

Hisar (Haryana) based JD Taurus, a JV between Jindal Defence Systems Private Limited (JDSPL) and Brazil-based global leader Taurus Armas S.A, has begun manufacturing pistols and revolvers, among many other small arms. The plant has an annual production capacity of up to 250,000 weapons.

Skydio, a leading American drone manufacturer with an R&D center in Bengaluru, has partnered with Indian firm Aeroarc to manufacture UAVs for defense customers in the Indo-Pacific region.

In addition to manufacturing the GE-F414 engine in India, GE plans to set up an MRO facility for the F404-GE-IN20 engine of the LCA-Tejas Mk1 variants. Thales plans to establish an avionics MRO facility in Delhi. Both will have an Indian partner.

Other Important Indigenisation Efforts

Meanwhile, Indian armed forces plan to procure 91 Israeli Heron Mark 2 UAVs (27 for the Army, 22 for the Navy, and 42 for the IAF). The INR 30,000 crore ($3.7B) UAVs will be partly or wholly made in India or assembled here.

Adani Defence and Aerospace unveiled its indigenously manufactured Drishti 10 Starliner UAV for ISR operations of the Indian Navy. The company has also started South Asia's largest ammunition & missiles complex in Kanpur, at a 500-acre facility. They will produce a diverse range of high-quality ammunition for the armed forces, paramilitary forces, and police and meet nearly 25% of India's annual requirements.

Bharat Forge recently acquired a 51% stake in the Indian arm of Ukrainian firm Zorya Mashproekt. The company's gas turbine power plants are used in all Indian Navy destroyers and the Talwar class frigates.

Nibe Limited has opened a 250,000 sq.m plant in Pune focusing on producing critical systems for the defense sector, including heavy engineering structures for Medium-Range Surface-To-Air Missile (MRSAM).

Nagpur-based Solar Industries India Limited, which is big in industrial explosives and has manufacturing facilities in many countries, has demonstrated the Bhargavastra anti-drone and swarm system.

DG Propulsion Pvt Ltd successfully completed demo test runs on DG J 40 small jet engine meant for UAVs. Garuda Aerospace has become the first company in India to get dual certification for training and manufacturing small and medium-class drones.

IAF had awarded a Rs 300 Crore ($37M) contract to Veda Aeronautics under the IAF's Mehar Baba Swarm Drone Competition.

The Space start-up Pixxel recently launched its satellite manufacturing unit in Bengaluru, where

it can assemble, integrate, and test 40 satellites weighing 100 kilograms every year. Pixxel plans to launch a series of small, home-built satellites, "Fireflies," with five-meter resolution hyper-spectral imagery starting in June.

The first spy satellite in India to be made by TASL is set to be launched in a SpaceX rocket in May 2024. Bellatrix Aerospace has announced the successful testing of its rocket propulsion systems, which were entirely developed in-house. Rudra and Arka propulsion systems were launched on board ISRO's PSLV C-58 launch vehicle on January 01, 2024.

Academia Supporting Defence Indigenisation

IIT Mandi is developing a Quantum computer that will use photons for computing. IIT-Madras is building a world-class facility for ocean engineering and maritime technology. IIT Jammu is working on anti-drone systems. IIT Kanpur has created India's first hypervelocity expansion tunnel test facility (S2), which DRDO and ISRO will use.

IIT Guwahati is working on semiconductors. IIT Jodhpur is making a 3D-printed hybrid UAV prototype for all domains. IIIT-B Bangalore and the Software Development Institute (SDI) of the IAF are collaborating on defense software. Central Scientific Instruments Organisation (CSIO) Chandigarh and HAL have established a Centre of Excellence for Avionics.

Highest Level Push & Way Ahead

The evolving global security environment and India's global power aspirations underscore the imperative need for India to fortify its defense production capabilities and foster self-reliance. India's defense exports were now at an all-time high and growing rapidly.

New Delhi has set a target of Rs 35,000 crore ($4.5B) in defense exports by 2025 and 50,000 crores ($6.2B) by 2028-29. The defense production targets are Rs 1.75 lakh crore by 2025 and Rs 3 lakh crore by 2028-29.

The government aims to manufacture high-end systems like aero-engines & gas turbines in India in the next five years. The figures are highly achievable with a little effort.

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Commentary

1. Resurgence Of F-22 – US Air Force Gets 'Super Stealthy' Raptors Close To China To Fight J-20 Mighty Dragons - https://www.eurasiantimes.com/resurgence-of-f-22-us-air-force-gets-super/#google_vignette

Further Reading

1. Space Triad for Deep Battles - https://www.financialexpress.com/business/defence/ptriadnbspfornbspdeepnbspbattles/3497341/
2. How did a rare multiple failure of a crucial component lead to F-16 crash in Tengah? - https://www.straitstimes.com/singapore/askst-how-did-rare-multiple-failure-of-a-crucial-component-lead-to-the-f-16-crash-in-tengah
3. It's time to figure out global space traffic management - https://spacenews.com/time-figure-out-global-space-traffic-management/

4. What are India's top-secret Directed Energy Weapons? - https://www.theweek.in/theweek/current/2023/07/21/what-are-indias-top-secret-directed-energy-weapons.html

5. China's Chang'e-6 is carrying a surprise rover to the moon - https://spacenews.com/chinas-change-6-is-carrying-a-surprise-rover-to-the-moon/

6. Hi-Tech, High Risk? Russo-Chinese Cooperation on Emerging Technologies - https://www.rusi.org/explore-our-research/publications/commentary/hi-tech-high-risk-russo-chinese-cooperation-emerging-technologies

"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."

The Centre for Air Power Studies (CAPS) is an independent, non-profit think tank that undertakes and promotes policy-related research, study and discussion on defence and military issues, trends and developments in air power and space for civil and military purposes, as also related issues of national security. The Centre is headed by Air Vice Marshal Anil Golani (Retd).

Centre for Air Power Studies
P-284 Arjan Path, Subroto Park, New Delhi - 110010
Tel.: +91 - 11 - 25699131/32 Fax: +91 - 11 - 25682533
Email: capsnetdroff@gmail.com
Website: www.capsindia.org

Advisor : AVM Ashish Vohra VSM (Retd)
Editor, Concept & Content : Gp Capt T H Anand Rao

Composed by Mr Rohit Singh
Tel.: +91 9716511091
Email: rohit_singh.1990@hotmail.com