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India looks at drones to power its armed forces

Country gears up for era of soldier-less battlefields despite gaps in policies on use of drones

India is investing heavily in developing unmanned vehicles — ground, sea and air — as it gears up for a fast-approaching era of soldier-less battlefields despite the current void in policies governing how they will be used.

Government-run labs of the DRDO (Defence Research and Development Organisation) and National Aeronautics Ltd, along with state-owned defence manufacturer Hindustan Aeronautics Ltd, are working on several drone projects, right from vehicles that weigh under a kg to Rustom II, which will have a payload capacity of 350 kg.

The DRDO, which designed the Tejas light combat aircraft and drones such as Nishant and Lakshya, is putting together a policy document for the year 2020 as well as a more advanced one for 2025, which has laid emphasis on building the country's drone capabilities. But being a nascent technology, it is also looking at the country's premier research institutes for talent and new technology.

“We have good capability in terms of software and, with Make in India, several foreign companies are coming in, because of which production capabilities are bound to get developed. Why can't we put the two together and create UAVs for the air, ground and underwater?” said S Christopher, chairman of the DRDO, at a conference last week. The DRDO is also working on a series of unmanned vehicles including unmanned combat aircraft, or UCAV, which will be powered by the homegrown Kaveri engine. Similarly, HAL, which is a risk-sharing partner in the development of Rustom II along with the DRDO, is working with the Indian Institute of Technology, Kanpur, for the development of a 10-kg mini-rotary drone. With flight tests conducted successfully, HAL now plans to scale up the same technology for 50-kg, 200-kg and 500-kg rotary drones, said T Suvarna Raju, chairman of HAL, at the Aero India event. The plethora of global manufacturers displaying UAVs at Aero India this year signalled the interest of India's armed forces to procure these machines. Israel Aerospace Industries, Elbit, Saab, Boeing and many other smaller players gave a prominent display of their drones, some of which were capable of weaponised warfare. JK Organisation Friday announced its foray into India's drone market in partnership with Canadian firm MicroPilot. There are commercial sectors that will benefit from this.

Unlike Rustom II, with a wingspan of 20-odd metres, the market for mini-UAVs is huge. However, the market is being held back by the lack of policy governing how drones can be used, but which should likely be addressed by an upcoming drone policy.

“The demand for mini-UAVs is currently Rs 2,000 crore, but this is really constrained by a lack of clarity on the regulations, which is expected to go away in the next few months. Once that's behind us, we expect the market to grow by at least three times in the next three years,” said Rajesh Kakkar, chief executive, Global Strategic Technologies Ltd, JK Organisation.

JK's Deepti Electronics & Electro Optics Pvt Ltd (DELOPT) unit, which currently builds payloads such as cameras for small drones, has partnered Canadian firm MicroPilot to supply the autopilot system for these UAVs. With this, DELOPT hopes to become an even larger supplier of drone ancillaries to the armed forces, paramilitary or police, which are looking to deploy drone platforms built by other manufacturers.

Kakkar says the market for drones in India could grow by three times in the next three years once the government gives the industry more clarity. For the defence sector, India's ever-growing need for new fighter aircraft like the LCA and Sukhoi 30 MKI could potentially be offset by the use of UAVs.

Inside the BrahMos missile factory

The benefit of India gaining a seat at the elite Missile Technology Control Regime (MTCR) would be showcased to the world on March 10 as the upgraded version of the BrahMos cruise missile, with an extended range, will be tested by the Defence Research and Development Organisation. Man of the moment, DRDO chief Dr S Christopher, said immediate impact of India joining the club would be seen “on the BrahMos, whose range will now be increased from 290km to 450km.”

INDIAN PROWESS AGAINST THE DRAGON

INDIA BRAHMOS SPEED: Supersonic RANGE: 290km (Pre-MTCR) LAUNCH: Ship, submarine and land ROLE: Conventional	CHINA HONG NIAO SPEED: Sub sonic RANGE: 3,000km LAUNCH: Ship, submarine, land and air ROLE: Conventional and nuclear
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Arguably the world’s fastest conventional missile, which in flight covers a kilometer every second, the BrahMos, observers say hardly gives its target a chance. While its deployment has rattled adversaries, its evolution has been remarkably swift. The joint venture, the seeds for which were sown in 1993, had to be capped at 290km because India was not a part of MTCR.

Going ahead, efforts will be made to extend its reach to 800km as well as to bring out hypersonic, submarine launched and miniaturised versions. Nearly 570km northward from where Dr Christopher was speaking, in Hyderabad, a group of individuals seemed upset. The reason was a signed Parliamentary response by defence minister Manohar Parrikar where, in March 2016, he declared that the BrahMos missile had 65 per cent imported content. “There has been a gap in communication somewhere. The imported content is down to about 40 per cent,” said one among them.

At the 40-acre state of the art BrahMos Integration Complex (BIC) of the BrahMos Aerospace, where a 300-strong workforce carries itself with infectious pride, it isn’t too difficult to see why Parrikar’s remark did not go down well. Inside its biggest facility, the average age of the workforce is around 30 years. Operating out of neatly maintained, access-controlled integration units, youngsters conduct spot meetings and exchange notes right besides the 8.4m long missile. The BIC takes what Parrikar referred to – indigenisation – as its key challenge. As on date, Russia supplies a large share of the equipment. “In another year, we can go to 70 per cent in terms of indigenisation but not beyond,” said CEO and MD Dr Sudhir Kumar Mishra, who also doubles up as the Chief Controller (Research & Development), DRDO.

The Hyderabad-based complex offers twelve different stages of assembly for every single missile which at every stage involves quality control. While there are teams looking at issues within, there is also third party certification for the missile. “Random checks are conducted and for any item found unfit, the entire batch is discarded,” the staffer pointed out. “We’d rather have the missile parts fail here than in the air, right,” remarked Akula Harish, a senior systems engineer. By its nature, the missile performs the unthinkable once fired. To do so it undergoes stress and to make it ready, every electronic component undergoes a bump test which requires it to face severe jerks over one lakh times. Thermal shocks are also given to weed out weak points. “We subject the parts to temperatures from 200 degrees to minus 50,” said a staffer. All of this has had a role in ensuring that in the 54 flights of the missile, there has never been a major accident. However, team BrahMos often faces questions. For example, if the missile is so good then why isn’t Russia inducting it?

What happens if tomorrow India and Russia part ways? One way to answer critics is to always remain relevant. As a result, all eyes are firmly fixed on a test slated for the coming month. “When the world’s heaviest missile will be fired from the world’s biggest launcher on the Sukhoi, our air force will become the only one in the world with such a capability,” Mishra said.

Mon, 20 Feb, 2017

Indian Navy Inducts New Sailboat INS Tarini with All-Woman Team

As the first all women team of the Navy is training to circumnavigate the globe in a sailboat starting August this year, a new sailboat INS Tarini was inducted into service to enable the team to accomplish this arduous mission.

The boat is skippered by Lieutenant Commander Vartika Joshi and crew members include Lieutenant Commander Pratibha Jamwal, Lieutenant Aishwarya Boddapati, Lieutenant Patarapalli Swathi, Lieutenant Sh Vijaya Devi and Lieutenant Payal Gupta. They have undergone extensive training for the last one year for this challenging journey. The journey is expected to take four months with the crew sailing non-stop in all kinds of weather.

INS Tarini was commissioned by Navy Chief Admiral Sunil Lanba in Goa on Saturday and he announced that the all women team will embark on the global circumnavigation in August. The boat was built indigenously by Aquarius Shipyard Pvt. Ltd, at Divar, Goa. This is second ocean going sail vessel.

Elaborating upon the training of the all women team, Lanba said the crew has logged over 10,000 nautical miles on sail boat INS Mhadei, including a voyage from India to Mauritius and back and Goa to Cape Town braving through rough monsoon seas and heavy wind. This voyage was undertaken to expose the crew to dangers and vagaries of weather during monsoons when sea becomes rough and negotiating through it is a challenging task, officials said here on Sunday.

Lanba and senior Navy officers were briefed on INS Tarini's advanced features, including improvements, based on experience of operating INS Mhadei, which have been incorporated. On completion of the ceremony, the crew sailed the boat out of harbour displaying its agile handling capabilities. Incidentally, Commander A Tomy of the Indian Navy circumnavigated the world in INS Mhadei three years back and set a world record of completing the journey in 151 days.

The keel of INS Tarini was laid on March 27, 2016 at the Aquarius Shipyard. The construction was overseen by the Warship Overseeing Team, Goa and the vessel is being delivered before the scheduled date of delivery by the boat builder. Extensive trials of the newly built Tarini were successfully completed on January 30 this year.

Indian Navy will be operating four sailing vessels capable of open ocean deployments, that is, Tarangini, Sudarshini, Mhadei and Tarini, all four of which have been built in shipyards at Goa. Indian Navy is attempting to revitalise open ocean sailing and will also be inducting four 40 feet, state of the art open ocean racing sail boats, officials said.

THE ASIAN AGE

Mon, 20 Feb, 2017

Navy needs indigenous carriers, subs

By Abhijit Bhattacharyya

India's naval buildup is overshadowed by chronic time and cost overruns.

One does not require the wisdom of the great American naval historian Alfred Mahan or British admiral Julian Corbett to state the obvious: no nation can aspire to be a sea power without producing its fighting ships indigenously. Being the smallest of the three arms of India's defence forces (taking personnel strength as the

parameter), attaining expertise in the manufacture of quality (surface) fighting ships of up to 8,000 tonnes is the best to have happened to the Indian Navy. However, in the sub-surface and aircraft-carrier category, India is a late bloomer due to the lack of any sustained, long-term initiative.

Hence, it is obvious that one cannot manufacture sophisticated, technologically-complex submarines and aircraft-carriers without having long experience in the sea. And that is exactly the case with the Indian Navy. It was the second Asian Navy, after Japan, to induct a used 20,000-tonne aircraft-carrier of British origin, INS Vikrant, on March 4, 1961. (It was eventually scrapped in 2014-15.) A long “active sea-time” gave the right exposure to the Indian Navy men before India launched the first phase of building its own aircraft-carrier (also named INS Vikrant) on February 28, 2009 at Kochi. Although French DCNS and Italian Fincantieri were reportedly involved in its initial “conceptualisation and design” work, the completion of the 40,000-tonne-plus first indigenous aircraft-carrier will be a feather in the cap for the Indian Navy, thereby fulfilling a long cherished dream.

China has recently announced that its first indigenous aircraft-carrier Liaoning is combat-ready. Unlike India, China has been a case of “first produce, then use”. It would be interesting to see how the carriers of Delhi and Beijing sail in the future, though prima facie the Chinese aircraft-carrier is bigger at 60,000 tonnes (full load). They have emphasised on speed as one of the key elements.

Being a late entrant in submarine warfare perhaps helped India to be bold, brave and wise. Without producing a single indigenously-conceived and designed conventional underwater vessel, Delhi leapfrogged into the nuclear strategic missile submarine (SSBN/SSGN) club in 2004 at Visakhapatnam. No doubt Russian cooperation was “acknowledged” at the time of launching the 600-tonne submarine INS Arihant on July 28, 2009; nevertheless, it speaks volumes about India’s naval achievement and fulfilment of its “Make in India” vision. Here, one has to concede that China has been the Asian pioneer in nuclear submarine building, beginning its voyage before India way back in 1980 with three 5,700-tonne Han class nuclear subs.

As is well known, if a submarine succeeds in diving deeper than the standard 300 metres (985 feet) under the sea, things become that much more difficult for the anti-submarine assets to detect, identify and take position, defensive or offensive. Hence a recent report on India’s nuclear submarine INS Arihant’s “diving depth of 450 metres approximately” is promising. Another reported feature of the “dived speed” of 24 knots gives it an edge over other South Asian or West Asian submarines operating in the combat radius of the Indian Navy.

The positive story of India’s naval buildup, however, is overshadowed by chronic time and cost overruns. The Navy continues to struggle to maintain the “minimum deployable and to-be-deployed” fleet as often the speed of decommissioned ships outpaced the speed of commissioned ships. The classic example is reflected in the depleted strength of India’s submarine squadrons.

Indeed, things became acute at the beginning of the 21st century owing to the spill-over effect of former Soviet-origin ships on the Indian Navy. Precious time was lost on production, delivery schedule and maintenance programme of the ships, owing to breakup of the USSR in 1991 and the resultant disarray of Moscow’s shipbuilding industry. This setback was reflected in the 2011 CAG report: “Between 2011 and 2013, the Indian Navy would have only 61 per cent of its envisioned frigate fleet, 44 per cent of its envisioned destroyer fleet, and 20 per cent of its envisioned missile corvette fleet.” It must be remembered that the frequency, duration and out-of-area operational deployment of the Indian Navy is no longer what it used to be 25 years ago. The fleet’s “sea-time” has increased manifold, thereby putting pressure on its wear and tear as well as logistics and material management.

Admiral Gorshkov, an USSR-made, Russia-refurbished, India-used, carrier is another classic case of a monumental disaster due to cost overruns. A ship is neither produced overnight nor an FMCG product. Aircraft-carriers had been built by only seven (US, UK, France, Russia, China, Italy and Spain) countries; thus India became the eighth producer. Indeed, a blessing in disguise if India successfully commissions the carrier in 2019.

Good things apart, there still exist matters requiring urgent action, as can be gleaned from the CAG report tabled in Parliament on February 18, 2014: “Between 2005 and 2010, 113 of 152 Indian Navy refits were

completed after an accumulated delay of 8,629 days, or 23.6 years”. It attributed the delay to “growth attributable to the ageing ships, and the inability to ensure timely induction of new ships”.

Very serious stuff surfaced subsequently as Navy stated “that delays of five to 67 months in commencing mid-life upgrade (MLU) of naval platforms had prompted cascading delays in refitting other ships which resulted in operational unavailability”.

Another angle to India’s indigenous shipbuilding enterprise is the uncooperative bureaucracy. Indian Navy officials have long claimed that although it had received new platforms in the past decade, the defence and finance ministries had declined to provide additional funds to pay for the consequent increase in staffing levels, leading to meagre resources being stretched and to officers with limited experience assuming charge of technically-advanced vessels, many of which experienced mishaps.

Indeed, a serious matter pertaining to safety and security of the State even if half of these claims are found to be correct. The bottomline, therefore, comes down to administering and interfacing man and machine. India traditionally has never had an acute shortage of trained and qualified manpower. However, what is required now is time management. That itself will give boost to the indigenisation enterprise of the Indian Navy.



Mon, 20 Feb, 2017

IAF Cautious over Craft’s upkeep at AI Base for Want of Certificate

While the private airliners are now looking towards the Air India facility for maintenance, repair, and operations (MRO), the Indian Air Force (IAF) is still cautious about the upkeep of its transport fleet at the national carrier’s MRO centre for want of a mandatory certification by the Russian-based Ilyushin Design Bureau (IDB).

The IDB is a much acclaimed Russian aircraft design company, and IAF has mandated this for maintaining six IL-78 MKI crafts. Since the AI is not eligible for the upkeep, the crafts has to be taken to Russia thus losing out money. MRO involves fixing any sort of mechanical, plumbing, or electrical device should it become out of order or broken (known as repair, unscheduled, or casualty maintenance).

When contacted Air India Engineering Services Limited (AIESL) CEO HR Jaganathan downplaying the IDB certification issue, however, said that the national carrier MRO is ready to serve the IAF aircraft in question.

“We have been upgrading our facility and lot of things are happening and our MROs is world standard sans the IDB certification. We are also upgrading the computer testing technology for aircrafts by brining in the latest Automatic Test Equipment Computers (ATEQ) series VI which at one go can verify several problems in the aircraft. Earlier even the boilers, ovens, cabin instruments too used to go abroad for rectifications and changes but now Air India is equipped with one stop solution under one roof for all kind of aircrafts now flown in India,” said Jaganathan, who has been instrumental in refurbishing the MROs and signing of MoUs with other carriers.

Jagannath said this expertise can be used for MRO works of aircraft, mostly from the Air Force. “In Air Force, most of the aircraft are from Russia and historically Air India never had a Russian aircraft. If Air Force business comes to us and also get the OEM (Original Equipment Manufacturer) of these aircraft to support us, then sky is the limit,” he said.

Grenade-lobbing drones, 'dogo robots' in NSG kitty

3D fly-on-the-wall radar among weaponry added

Munition launcher

- *Indigenously made 'munition launcher system' can carry a pair of 38 mm grenades to stealthily drop in enemy territory using in-built spy camera. The drone has four rotors and is handled remotely by an operator*

Death on wheels

- *Israel-made 11.5-kg 'dogo robot' can move towards a holed-up terrorist and send his exact position and weaponry via camera feed. A small Glock pistol on board can shoot the target using a joystick*

A grenade-dropping drone, 3D fly-on-the-wall radar to see through a 20-metre-thick wall and a 'dogo robot' armed with a remote pistol are some of the latest weaponry provided to the NSG to undertake lethal counter-terror operations with a punch of stealth.

The federal contingency force, drawing from its experiences in combating terror attacks and hostage situations in closed spaces, has inducted some of the smartest gadgets and arms used by Special Forces and SWAT teams the world over.

A senior official said the 'black cats' force has recently inducted the German PSG1 A1, which carries an enhanced number of 20 rounds to engage and pin down targets for a longer time and is complemented with a longer range and extreme accuracy. The 7.2-kg rifle with telescopic sight is an upgrade of the PSG1 sniper variant used by the marksmen of the National Security Guard till now.

While the usage of drones or Unmanned Aerial Vehicles (UAVs) by security forces is common, the elite force has armed its crack teams with an indigenously-made 'munition launcher system' that can carry a pair of 38 mm grenades to stealthily drop in enemy territory with the aide and precision of an in-built spy camera.

The most lethal and clever gadget that is now adding to the strike potential of the NSG is the Israel-made 'dogo robot' that drags its 11.5-kg weight towards a holed-up terrorist and informs the commando teams about his exact position and arms and ammunition holding via a camera feed. It also sports a two-way encrypted audio system that allows the operator to listen and intervene in hostage situations without the flat device itself getting noticed.

The NSG, officials said, has procured a few pieces of the 'dogo robot' at a cost of Rs 76 lakh each, and it is named so taking inspiration from the capabilities of the Argentine Mastiff.

A 3D 'through wall radar', upgraded from the 2D variant which the NSG is understood to have used during last year's attack on the Pathankot IAF base, will give the commandos pictures from across a 20-metre thick wall with a 80 degree field of view.

The 14-kg radar sports a price tag of over Rs 1 crore and can be placed on the outside of a closed room like a fly-on-the-wall, an official said. — PTI

Parrikar to decide if defence chiefs' wives can go abroad at govt's expense

New Delhi: A debate is raging between the defence ministry and military headquarters over whether spouses of the army, navy or air force chiefs should be allowed to travel with them on an official visit abroad.

The sensitive issue has reached defence minister Manohar Parrikar, who is expected to give his opinion this month as his ministry and the military administration hold opposite views on conventions and travel rules.

The headquarters have underscored past convention to pitch for spouse travel, saying wives accompanied the chiefs since they pick up welfare measures for the military wings their husbands were in.

It is standard practice for these first ladies to head welfare associations of fellow military wives and play a key role in rehabilitation of families whose kin have laid down their lives for the country.

“This is a military convention and many countries such as France, Germany, Vietnam, Thailand, and the UK follow, allowing the spouses to accompany their husbands,” a former army chief told Hindustan Times.

But the defence ministry's finance wing has pointed out that only the President, Vice President and Prime Minister are allowed to take along their better halves at government expense during an official visit outside the country. Further, according to government rules, not even a Union cabinet minister can take his or her spouse on foreign trips. That includes the defence minister. At present, only Vice President Hamid Ansari travels with his wife, Salma Ansari. In terms of protocol, the services chiefs are ex officio officers of cabinet secretary rank and report to the defence minister. Parrikar is likely to speak to the three service chiefs and the defence secretary before he decides on the spouse travel rule.



An unchecked China could revive tension in South China Sea'

As the US-China relationship becomes fraught with tension, Asia is doing what it does best -looking for balancing powers to hedge against both an aggressive China and an uncertain America.

WORRY IN ASIA

- An unchecked China could revive tensions in South China Sea
- While Japan and India remain allies, Vietnam wants a toehold to gauge how US wants to weigh in
- Issue likely to come up when Vietnam's foreign minister and vice-president visit in coming weeks
- Ties between Malaysia and China now a potential political flashpoint for Najib govt
- Trump administration mum on Asean region so far

Over the coming weeks and months, India plans to ramp up its already strong engagement with Asia with an eye to building alliances, hedging and projecting itself as a “leading power“ in the region.

Vietnam's foreign minister Pham Binh Minh and vice-president will visit India in the coming weeks. Malaysia's already embattled PM Najib Razak is also expected to make a trip and India expects to host Malcolm Turnbull, the Australian PM, later this year. The Bangladeshi PM is likely to visit in April, while foreign secretary S Jaishankar is currently on a tour of Sri Lanka, China and Bangladesh, both as a neighbourhood visit as well as contextualising these relationships within the larger Asian chessboard.

For the countries of the region, the initial days of the Trump administration has been replete with confusing signals. There is a general sense that the US-China relationship will be frosty at best, and the impact of this would be felt in every regional capital. Trump and his top cabinet picks have indicated a more confrontational stance on China's island-building, definitely more aggressive on trade and tariffs, while walking away from the only Obama “pivot“ exercise, the TransPacific Partnership (TPP). The Trump administration does not believe, as some do,

that undoing TPP will open strategic space for China. It believes that TPP would have had a limited impact in “containing” China and that Asian nations were in any case wary of Beijing's intent and would look to hedge their bets.

On the other hand, after showing some desire to change the US-China template, Trump reaffirmed the “one-China” policy, secretary of state Rex Tillerson moderated his comments on South China Sea and North Korea's recent missile test went off with a mild reproof from Washington. For regional powers, it means two things -they know what to expect from China and are concerned, but they do not know much of what to expect from the new US administration, a cause of equal concern.

Philippine defence secretary Delfin Lorenzana told an interviewer last week that China might build on Scarborough Shoal, 300km from Manila, if it felt it would be unchecked. “If we allow them, they will build,” he was quoted as saying. “That's very, very disturbing. Very much (more) disturbing than Fiery Cross because this is so close to us.” The Philippines is arguably the closest US ally in the Asean region.

Vietnam feels particularly let down with the death of TPP, having banked on it as a political signal. An unchecked China could revive tensions in South China Sea. While Japan and India remain steady allies, Hanoi is keen to get a better sense of how the US wants to play in that region. This would be one of the top topics of conversation between Vietnamese leaders and their Indian counterparts. India, thus far, appears to be on the right side of the new Trump administration and this gives it an interesting insight into Washington, these countries feel.

Malaysia had fallen into China's sphere of influence, particularly after Beijing stepped in to rescue the scamridden 1MDB company. Malaysian ports are hosting Chinese submarines, like Sri Lanka, and Malaysia has committed to buying submarines from China as well.



Mon, 20 Feb, 2017

US aircraft carrier patrols S China Sea

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BEIJING: An exchange of angry words is expected as a US aircraft carrier entered the South China Sea for “routine patrolling” over the weekend amid fresh tensions between Beijing and Washington under the month-old presidency of Donald Trump.

USS Carl Vinson, accompanied by a fleet of warships, is no stranger to the disputed waters and has been deployed in the region several times before.

But this time could be different, with tension and unease running high between the two countries despite a phone call between President Xi Jinping and Trump.

Trump has already angered China by talking to Taiwanese President Tsai Ing-wen, the head of a country that China claims as a “breakaway region”.

China claims almost the entire

SCS, and reacting to the visit of the aircraft carrier, its ministry of foreign affairs warned the US it should not challenge China's sovereignty in the region.

“China has indisputable sovereignty over the South China Sea islands and their adjacent waters. China respects and upholds the freedom of navigation and overflight in the South China Sea which countries enjoy under international law, but firmly opposes any country's attempt to undermine China's sovereignty and security in the name of the freedom of navigation and overflight,” ministry spokesperson Geng Shuang said on the “routine patrol” by the US aircraft carrier.

“We also urge the US to refrain from challenging China's sovereignty and security and to respect regional countries' efforts to maintain peace and stability in the SCS,” Geng said.

Wrap-up: ISRO sets the bar high up in sky

India has also firmly established itself as a big player in space, the final frontier.

ISRO on Wednesday launched a rocketful of 104 satellites into space over the course of 18 minutes, nearly tripling the previous record for single-day satellite launches. While president, Pranab Mukherjee, called it “a landmark in the history of our space programme,” Prime Minister Narendra Modi praised ISRO stating, “What our Isro scientists have achieved will ensure that their names will be written in golden letters forever.”

The launch was high-risk because the satellites, released in rapid-fire fashion every few seconds from a single rocket as it travelled at 27,360 km per hour, could collide with one another if ejected into the wrong path.

The latest PSLV launch cost just \$15 million but is indeed a most distinguished feather in ISRO’S cap. The fact that the United States is India’s biggest “space customer” is a further reflection of ISRO’S achievements. How remarkable the launch of 104 satellites in one flight is can be understood from the earlier record — of 37 satellites launched in one go by Russia three years ago. After the record launch, ISRO is now looking at an orbiter to Venus, besides a second mission to Mars after creating history with its MOM mission. Apart from becoming a key nation in a growing commercial market for space-based surveillance and communication, India has also firmly established itself as a big player in space, the final frontier.



Hughes India Open To \$500m Investment in Satellite Systems

By Neha Alawadhi

Targets improvement in areas such as education and healthcare through a reduction in the cost of high speed broadband Internet connectivity

Satellite communications company Hughes India is willing to invest up to \$500 million in India to set up satellite systems that could help in areas such as education and healthcare by reducing the cost of high speed broadband Internet connectivity.

“The market for sat com (satellite communications) is the one that cannot be served by WiFi. Even in developed countries like the US, about 10% of households will never have access through terrestrial technology like fibre or wireless...This last 10% unserved or underserved, we've been trying to develop technology using sat com to serve this population,” Pradman Kaul, president of Hughes Network Systems told ET. The high cost of satellite broadband is seen as an impediment to adoption, but prices could come down if private players are allowed to set up satellites, taking the load off the sole supplier the Department of Space. “Economically, we have been charging customers a base rate of \$50-60 a month and this provides a certain number of gigabits and capacity, pretty comparable to terrestrial technologies,” Kaul said.

Another hurdle to large scale adoption of technology in India has been the lack of implementation of the sat comm policy, which has been in place since the year 2000, but has not granted approval to any private player so far.

“The policy isn't a hurdle as both the FDI and the Satcom policy allow Indian registered companies with FDI to establish and operate satellites in India. A company interested in setting up a satellite systems must also obtain permission from the Department of Space.

However, till date no one has been granted permission under this policy but we are hopeful our proposal will be favourably considered,” said Kaul.

Last year, the government gave in-principle approval for ground segment of a GSAT-11 spacecraft at a cost of ₹1,117 crore, which can be used for services such as broadband and VSATs, especially in rural areas. The satellite is targeted for launch this year.

Indian Space Research Organisation chairman AS Kiran Kumar said last year that India's space capacity of 34 working satellites is barely half of what the country needs and is severely limited to meet increasing demands from the Centre. It is here that players like Hughes see an opportunity for themselves.

The fact that Department of Space, which gives permissions for satellite communications operations is also an operator of sat comm services, could be one of the reasons why permissions under the policy have been slow to be approved.

“Governments across the world have been deregulating and launching their own satellites and creating businesses with it,” said Kaul. Hughes provides satellite broadband in Europe and Brazil.

Education and learning, health and finance and banking are some more areas where high quality ubiquitous broadband access through satellite could be used. Others areas such as like cellular backhaul, entertainment are among other application areas.

Business Standard

Mon, 20 Feb, 2017

SpaceX launches rocket carrying supplies to space station

Elon Musk's Space Exploration Technologies successfully launched its second rocket in as many months on Sunday, bringing it a 10th of the way to its goal of deploying 20 to 24 rockets this year.

The launch of the rocket, which is ferrying supplies destined for the International Space Station, was halted Saturday about 13 seconds before its scheduled liftoff because of an issue with the second-stage engine. On Friday, the rocket was investigated for a “very small” leak in the upper stage before it was deemed adequate to fly, Musk said on Twitter.

The launch — SpaceX's first from historic “39A,” the storied complex at NASA's Kennedy Space Center in Florida that was home to the famed Apollo missions — was the company's second since a fireball destroyed a different rocket and its payload on a Florida launch pad in September. SpaceX, which completed just eight missions in 2016, successfully returned to the skies last month with the delivery of 10 communications satellites into orbit.

SpaceX has contracts with the National Aeronautics and Space Administration valued at \$4.2 billion to resupply the Space Station using its unmanned Dragon spacecraft and ultimately to ferry astronauts to the station from the US with a version of Dragon that's capable of carrying crews. The Government Accountability Office said Thursday in a report that SpaceX and competitor Boeing won't be certified this year to send astronauts to space and may be delayed into 2019 because of potential safety hazards. Musk, who's also CEO of Tesla, founded SpaceX 15 years ago with the goal of sending humans to Mars. The closely-held company makes rockets at its headquarters in Hawthorne, California, and has contracts to launch commercial satellites as well as fly missions for NASA and the US military.

THE HINDU

Mon, 20 Feb, 2017

Why Earth's inner core doesn't melt

An energy distribution cycle keeps the core solid despite it being hotter than the surface of the Sun

Scientists have discovered why the crystallised iron core of the Earth remains solid, despite being hotter than the surface of the Sun. Researchers at the KTH Royal Institute of Technology in Sweden found that on the

edge of the inner core, pieces of crystals' structure continuously melt and diffuse only to be reinserted due to high pressure like "shuffling deck of cards."

This energy distribution cycle keeps the crystal stable and the core solid.

Spinning within Earth's molten core is a crystal ball — actually a mass formation of almost pure crystallised iron — nearly the size of the moon.

Understanding this strange, unobservable feature of our planet depends on knowing the atomic structure of these crystals — something scientists have been trying to do for years.

As with all metals, the atomic-scale crystal structures of iron change depending on the temperature and pressure the metal is exposed to.

Atoms are packed into variations of cubic, as well as hexagonal formations. At room temperatures and normal atmospheric pressure, iron is in what is known as a body-centred cubic (BCC) phase, which is a crystal architecture with eight corner points and a centre point.

However at extremely high pressure, the crystalline structures transform into 12-point hexagonal forms, or a close packed (HCP) phase.

At Earth's core, where pressure is 3.5 million times higher than surface pressure — and temperatures are some 6,000 degrees higher — scientists have proposed that the atomic architecture of iron must be hexagonal.

Anatoly Belonoshko from KTH said data showed that pure iron likely accounts for 96% of the inner core's composition, along with nickel and possibly light elements.

Temperature impact

At low temperature, BCC is unstable and crystalline planes slide out of the ideal BCC structure. But at high temperatures, the stabilisation of these structures begins much like a card game — with the shuffling of a "deck."

Mr. Belonoshko said in the extreme heat of the core, atoms no longer belonged to planes because of the high amplitude of atomic motion.

"The sliding of these planes is a bit like shuffling a deck of cards. Even though the cards are put in different positions, the deck is still a deck. Likewise, the BCC iron retains its cubic structure," he said.

Such a shuffling leads to an enormous increase in the distribution of molecules and energy — which leads to increasing entropy, or the distribution of energy states. That, in turn, makes the BCC stable, he said.