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India and the ASAT Weapon

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Introduction

Anti-Satellite (ASAT) technology continues to proliferate in terms of both weapons and dual-use technologies. The three major powers–US, Russia and China–have proven ASAT capabilities while several other space-faring nations are working on securing such assets. After the successful testing of the Agni V intercontinental ballistic missile, the discourse amongst Indian strategic experts, DRDO scientists and military analysts has moved towards reconciling as to whether the next logical step for India should be the demonstration of proven ASAT capability. The US and Russia have long established their ASAT capability with direct-ascent and co-orbital missile systems, respectively. Closer to our neighbourhood, the Chinese launch[1] of a ballistic missile with a kinetic-kill vehicle (KKV) payload on January 11, 2007, is a clear demonstration of an ASAT capability, comparable to the US' interceptor strike technology.[2]

This has tacit implications on India's own choices in this regard. However, a policy decision in this direction will need to be *timely* and *strategic,* taking into consideration the possible emergence of legal regimes and powerful norms restricting ASAT testing, growing concerns over space debris, types of ASAT technologies including new breakthroughs in this field and more importantly evolving threats from adversaries possessing or developing such capabilities.

ASAT Technology Breakthroughs

The foremost aspect linked to an ASAT weapon is the type. There are a variety of ASAT capabilities that range from cyber-attacks on space systems, Electro-Magnetic Pulse (EMP) explosion devices, directed-energy weapons and targeted missiles for destruction of satellites. The US, Russia and China have developed such capabilities in varying degrees. Simultaneously, technological developments both on the military as also civilian dual-use research front could lead to new breakthroughs in ASATs. Some of the more technologically conceivable ASAT weapons of the future include pellet cloud attacks on low-orbit satellites, microsatellite technology and particle beam weapons. Amongst these wide ranging ASAT

technologies, cyber weapons and laser blinding do not have any lasting effect on the satellite system. Missile technology, on the other hand, has the ability to inflict permanent damage to the satellite system.[3] Therefore, this ASAT weapon is likely to be the most potent military tool for the armed forces to possess over the next few decades, notwithstanding a revolutionary technological breakthrough. The proliferation of ballistic missile technology will further accentuate this trend.

However, what is necessary is not just the acquisition of the capability but a demonstration of the same, in the interest of ensuring the required degree of deterrence against potential adversaries. It is widely speculated that the US ASAT test in 2008 was in retaliation to the Chinese test in the previous year, even though the former already has a well established reputation in terms of this capability. India has to take into consideration Chinese postures on ASATs, especially following its move of laser blinding US satellites in 2006[4] with a kinetic kill ASAT in 2007. By doing so, irrespective of international criticism, China proved its capability to effectively execute ASAT attacks. Keeping in mind its own military calculations, India needs to firmly establish credibility in ballistic missile type ASATs—even a one-time demonstration should be sufficient.

The Space Debris Issue

The second most important aspect related to the ASAT weapon, particularly the ballistic missile variety, is the consequences such weapons have in terms of the space debris problem. Orbital debris is one of the biggest concerns on space, one that is likely to persist in the future.[5] Although military planners often downplay the risks, there is a genuine threat to satellites from the growing space debris. At present, there are approximately 22,000 items, larger than 10 cm in size, in space and around 500,000 objects ranging between 1 to 10 cm.[6] More than 20,000 space debris pieces resulted following the recent Chinese and US ASAT tests. What is interesting, however, is the difference in how the international community viewed the two tests.

Even though many experts believe that the US' 2008 test was in reality a response to the Chinese ASAT test, by maintaining the threat of the satellite re-entering the earth's atmosphere along with the supposed high possibility of the re-entry of a hydrazine tank, the US was able to provide credible justification for the ASAT test. The emphasis on the risk of the satellite falling in an inhabited area and causing potential harm to human lives successfully contained the international condemnation.[7] The US also ensured that the international community was duly warned of the missile launch and emphasised on minimising the creation of debris fields.

On the other hand, China was criticised for the way it conducted the ASAT test. Unlike in the case of the US test, the international community was not informed about the launch, which in itself amounted to violation of international conventions.[8] Furthermore, the Chinese test contributed significantly to the debris field as compared to the American ASAT test. Immediately after the Chinese ASAT test on January 22, 2007, CelesTrak calculated that the orbital path of at least 1,899 satellites would pass through the debris field created by the Chinese ASAT test. Analysis suggests that only about 6 per cent of this debris will have re-entered the Earth's atmosphere by 2017, as against 79 per cent, which will continue to be in Low Earth Orbit (LEO) till 2108.[9]

Another big difference between the two tests was in the intercept altitude, which in turn has a direct bearing on debris creation. Closer the intercept to the atmosphere, lower the debris created. The USA-193 satellite was intercepted at an altitude of 247 km. China intercepted its satellite, the FY-1C, at an altitude of 864 km. This 600-odd km gap resulted in major differences in the debris created in the two tests—even though the satellite mass of USA-193 was nearly three times that of FY-1C.

India is part of various non-binding international agreements and guidelines to reduce the amount of debris and an ASAT test would need to correspond to its political position, implying the need to balance its strategic requirements while adhering to its international commitments and responsibilities. Choosing the right rationale and the appropriate technicalities, India could execute an ASAT test that would prevent an international backlash. Citing "security threats" to carry out such a test would feed the regional threat paradigm adversely and damage the country's image as a responsible space faring nation. Morever, India will find it difficult to get international support for such a test.

The Evolving State of Arms Control

The third factor affecting India's decision to conduct an ASAT test is the employment of norms and treaties to regulate conduct in outer space. India, along with other Group of 21 nations, has expressed its view that an immediate ban on "active space uses of a destructive nature" was needed as a "necessary interim solution".[10] Militarisation refers to the use of satellites for the purpose of the defence forces. In fact, space can be considered to have been militarised ever since the launch of the first communication satellite. Today, the armed forces rely on satellites for surveillance, navigation and warning systems.

On the other hand, the issue of weaponisation of space has been trickier. Weaponisation refers to the placement of weapons, or devices with destructive capability, in space. This is reflected in the joint Russia-China draft Treaty on the Prevention of the Placement of Weapons in Outer Space, the Threat or Use of Force against Outer Space Objects (PPWT) proposal at the Conference on Disarmament (CD). The US opposed the proposal as it wanted ground-based ASATs to be included in the definition of space weaponisation. The two ASAT tests conducted in the last five years demonstrate the destructive capability of missiles targeting satellites launched from ground. While Prevention of an Arms Race in Outer Space (PAROS) treaty has gained a lot of support in the UN General Assembly, Israel and the US continue to resist it. The US has also been fundamentally opposed to China linking its support to the PAROS with the negotiation on a Fissile Material Control Treaty (FMCT). A stalemate has been in effect since 1995 as a result of this stand-off.[11]

Following the slow progress of a legally binding document, discussions on transparency and confidence building measures (TCBMs) have taken centrestage in multilateral fora.[12] TCBMs, besides being an effective tool in military threat reduction with an aim to minimise misunderstandings and tensions, have been a useful mechanism in arms control.[13] The US, however, has taken an alternate approach to the concept of TCBMs in outer space. According to the National Space Policy, "the US is seeking to enter into TCBMs to define space activity and conduct as an alternative to entering into legally binding treaties".[14] Meanwhile, the EU has stepped up pressure on establishing a code of conduct (CoC)for

space and is making significant inroads in developing a CoC that is acceptable to the larger international community. The establishment of stricter international norms and regulations on ASAT may be slow but the evolving global scenario has made the requirement for it all the more necessary. In this context it is also relevant to understand the history of the Non-Proliferation Treaty.[15] The discriminatory nature of the NPT proved to be a critical drawback to India's global ambitions. Thus, it is imperative for India to determine whether there is a risk of such a situation repeating itself in a possible future treaty which bans the testing of ASAT weapons.[16] An NPT-like treaty would endanger India's possibility of being recognised as an ASAT capable space-power if it demonstrates its capability after the legislation is passed.[17]

Thus, while India may seem to have sufficient time to acquire the requisite technology to develop ASAT capabilities of its own, it needs to keep in mind the development of treaties which may ban the testing of ASAT weapons. India would be well advised to take stock of its available technological capabilities and move towards having a proven ASAT capability before the negotiations in the CD or the Space Code of Conduct make any significant progress towards conclusion.

Ambiguity vs An Actual Test

The fourth dimension relating to India's ASAT test is the domestic discourse on the issue. While the Chinese ASAT test definitely raised concerns in the US regarding the security of their space assets, few heard the alarm bells ringing in New Delhi. The successful testing of India's anti-ballistic missile, on March 6, 2011, was touted as a step towards developing an indigenous ASAT capability. Clearly, the development of the second phase of India's ABM programme, targeting ballistic missile with a range of 5,000 km, would bring it closer to an ASAT weapons capability. Mr. V.K. Saraswat, the Director-General of the Defence Research and Development Organisation (DRDO), publicly acknowledged that India is developing and acquiring the necessary technologies needed to destroy an enemy satellite.[18] In terms of capability, DRDO has claimed that it has developed the three necessary elements required to destroy a satellite—a long-range radar, a missile, and a 'kill' vehicle.[19] Although India has made it clear that it is in the process of acquiring an ASAT capability, there have been no indications of conducting a test.

One school of Indian experts believes that India need not conduct a test. It has been postulated that the ambiguity of India's capability should be enough to serve as a deterrent, especially in light of the fact that the failure of the test would be a setback for the credibility of the deterrence programme. Then there is also the issue of maintaining integrity with international guidelines pertaining to space debris. High level officers of the scientific community in India have cited debris creation as a reason for India testing its ASAT capability using electronic simulations.[20] Such views have not found resonance amongst military planners as also other strategic experts who reiterate the need for 'actual demonstration'.

While there is no disagreement on the fact that India develops effective targeting and precision capabilities in its ballistic missiles, the experts argue that ambiguity alone would not suffice and India should, therefore, consider having a proven capability.[21] Arguably, the Chinese publicly acknowledged that they would not be conducting any more ASAT tests; they did so only after demonstrating beyond doubt their capability to target in orbit satellites.[22]

Political Question of Capability Demonstration

The question of demonstrating its ASAT capability also poses a political dilemma for India. India has traditionally held a stand against the militarisation of space, more so with regard to space-based weaponisation. India has held an opinion that space should be a neutral zone accessible to all and it should be utilised for peaceful purposes only.[23] The ability to fully utilise a global commons is also accompanied by the need to keep it safe and secure. In the case of outer space, the international community needs to take due cognizance of the need to mitigate the threat posed by space debris. In fact, India has been consistent in seeking a ban on space weapons at the UN and other international fora such as the Conference on Disarmament.

Over the last decade or so there has been a gradual softening of this stance. The transformation gained impetus after the 2007 Chinese ASAT test. Cognizant of the missile threat from China and Pakistan, and the need for high technology transfer, indications of change in India's policy were first visible in the nuanced response to President Bush's National Missile Defense (NMD) plan in 2001.[24]

Subsequently, India has maintained an ambivalent stand but with a continued rhetoric against an arms race in space and keeping its options of a missile defence system open. This stand was reflected in then Foreign Minister Pranab Mukherjee's statement at the inaugural session of the *International seminar on Aerospace Power in Tomorrow's World in 2007*.[25] He argued for the peaceful use of outer space while not discarding the possibility of using space for military-oriented purposes. At a later address to the National Defence Academy, he pointed to the need for developing more sophisticated mechanisms to tackle the threat posed by China.[26] Similarly, Defence Minister A. K. Antony noted the high reliance on space-based assets during military operations on ground.

However, advocating the peaceful use of technology, Mr. Antony reiterated the stated rhetoric of discouraging the weaponisation of space. He conceded that India's "concern is to maintain the right balance between defence and development, since they cannot be mutually exclusive or part of a zero-sum game".[27]

After the Chinese conducted their test in 2007, the voices in India calling for greater militarisation of space have only grown—especially from the armed forces spearheaded by the IAF. Recognising an effective double-standard in China's position regarding issues of debris and ground-based ASAT weapons, India needs to re-evaluate its stance on testing an ASAT weapon.

China's reassurances on not conducting any more tests, however, have to be viewed with suspicion. The draft proposal of the PPWT, put forth by China and Russia, only takes into cognizance the placement of weapons in outer space and not ground-based weapons. Even while suggesting the PPWT, they have not refrained from their military space activities. China has also disregarded debris as an issue to be covered by any code while they collaborate with COPUOS (Committee on the Peaceful Use of Outer Space) on debris related issues. They have made it clear that they will not support any form of international legislation that considers debris to be a point of concern.[28]

International Cooperation

India has been projecting itself as a responsible democratic nation, giving a lot of importance to international forums. In such a scenario, India should be mindful of involving the international community in its decision to conduct an ASAT test. China may have escaped without any international repercussion other than its act being condemned. However, the chances of India being extended the same privilege should not be taken for granted. India at the least has to be mindful of international concerns surrounding debris and also a space arms race. It would be tactically in India's interest to garner diplomatic support before making its decision to conduct an ASAT test. The US owns and operates 442 of the 999 active satellites in orbit.[29] Thus, it is imperative that India garners US support before making its decision to conduct an ASAT test. Having US support will go a long way in mitigating the possible repercussions that India may face if it demonstrates its capability.

India should also look at partnering with democratic states with similar security concerns. Among the key nations with a strategic interest in developing such a capability will be Japan and Israel.[30] Japan and India have a common concern in China developing its space-based military-oriented capability. This makes them natural partners and the possibility of cooperation between the two countries should be explored.

India has enjoyed a burgeoning relationship with Israel in matters of technology and military; Israel is one of India's largest arms providers.[31] The two have also successfully explored their relationship in space cooperation; India's indigenous launch capability is complimented by Israel's capability in developing small and advanced satellites. Israel has also been supportive of "India's ambitions...of developing space security capabilities".[32]

Assessment

The question of India demonstrating an ASAT capability is highly contingent on the issue of space debris, the political dilemmas surrounding space activity and India's commitments at various international fora. However, there are regional dynamics that need to be factored in before arriving at a particular stance on ASAT tests. The Chinese 'double-standards' regarding issues of debris and ground-based anti-satellite weapons as also the threat posed by Chinese proliferation of ASAT technology to Pakistan requires an Indian re-think on testing an ASAT weapon. Even if this means accelerated Chinese-Pakistani cooperation on ASATs. Pakistan is nowhere in the running as far as its space capabilities are concerned. Nonetheless, it need not be a space-faring nation to develop ASAT capabilities. Apart from the possibility of exploring jamming technologies, being a missile power, Pakistan does have the potential to develop an ASAT missile technology of its own.[33]

While the problem of space debris can be dealt with, as was witnessed in the way the US carried out its test in 2008, the political repercussion will be a trickier problem to handle. At the same time, India also has to avoid a repetition of a post-NPT-like ostracization. International support and partnership will be critical to the execution of an ASAT test. Keeping the above factors as a backdrop, a roadmap could be prepared to aid policy decisions, if and when India decides to test an ASAT weapon.

Road-map for an ASAT Test

- India should consider a window period of 5 to 10 years for a legal regime which comes into place banning ASAT tests. This could be a binding treaty (less likely) or may arise from customary laws (more likely). India should focus in the few years to enhance its missile targeting and precision capabilities. A successful test would boost India's overall deterrence capability.

- The satellite to be targeted should be an inactive satellite that poses a threat of re-entry. One such satellite that could be considered is the RITSAT-2 satellite, which is orbiting at an altitude of 551 km.[34] India should consider bringing down the altitude of its target satellite so that the resultant debris poses minimum threat to other satellites.

- Due to the threat posed by space debris, the international perception of ASAT tests is quite negative. Hence it is imperative that India has the support of some of the top tier space powers, particularly the US, before it carries out the test. International collaboration in particular, with Russia, Israel and Japan should also be sought on vital technologies required for improving targeting capabilities.

- India need not look at direct-ascent ASATs alone. Investments in directed-energy weapons and the use of de-orbiting technology as well as cyber technology would also play a very important role in raising India's space deterrence capabilities. De-orbiting technologies in particular are important given their ability to neutralise the effectiveness of the adversary's satellite by sending it out of its active orbit as also not aggravating the debris problem. Such technologies can be considered at par with ballistic missiles.[35] However, they may take longer to develop.

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