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India's A-SAT test and what it tell about the country's capability to shoot down Ballistic Missiles

The A-SAT test was about more than just intercepting a satellite in orbit, it was also about India's improving ballistic missile defence capabilities.

By Prakhar Gupta

On 27 March, after keeping the nation on tenterhooks for an hour amid serious tensions with Pakistan post the Balakot airstrike, Prime Minister Narendra Modi announced in a live television broadcast that India has joined an exclusive club of 'space superpowers' by demonstrating a strategic capability that few countries possess. Usually in news for putting a satellite, or 104, in orbit, this time India had destroyed one using an anti-satellite (A-SAT) weapon, demonstrating its ability to hit targets in space.

In a stealthy planned mission, approved sometime around 2017, the Prithvi Defence Vehicle Mark-II of the Defence Research and Development Organisation (DRDO) struck a live satellite, launched into a sun-synchronous orbit in January this year, at a deliberately low altitude of 282 kilometres. The configuration of the missile, which the DRDO suggests was developed specifically as an A-SAT weapon, remains largely unknown. What's clear, however, is that some critical technologies developed for India's Ballistic Missile Defence (BMD) programme feed into this mission.

And if Modi's televised speech on this occasion is anything to go by, the A-SAT test was about more than just intercepting a satellite, it was also about India's improving BMD capabilities. Modi dubbed the A-SAT test as 'Mission Shakti', a moniker similar to the one given to India's 1998 nuclear tests — Operation Shakti. While the two are not comparable, Modi's message wasn't lost on anyone. Two, he laid special emphasis on the promptness of the weapon system, which used BMD components, stating the fact that the mission was completed in less than three minutes. For a ballistic missile interception to be successful, timing is critical.

India's BMD Programme

India's BMD, which has now been in development for nearly two decades, is structured as a two-layer system. It currently has two interceptor missiles — the Advanced Air Defence (AAD) missile for endo-atmospheric interception and the Prithvi Defence Vehicle (PDV) for exo-atmospheric interception. The AAD interceptor is meant for terminal phase interception — that is after the missile re-enters the earth's atmosphere. The PDV has been designed for mid-course interception — that is killing an incoming ballistic missile in space after its rocket burns out.

Under the first phase of the BMD programme, India has developed the capability of intercepting ballistic missiles which have a range of up to 2,000 km in both endo-atmosphere and exo-atmosphere in the altitude range of 20 to 40 km and up to 150 km respectively. This phase of the BMD has been tested 13 times and, by some accounts, is ready for operational deployment.

In 2014, it was reported that the DRDO was working on "a missile launch pad in Alwar and a missile interception base in Pali district". Similar reports appeared in 2017, saying the government had approved two villages in Rajasthan's Alwar and Pali districts for the installation of, what reports said, was a "ballistic missile defence grid". The forest department, reports said back then, had cleared 850 hectares of land in Alwar district and 350 hectares in Pali district in 2014 for this project. There were

no reports of movement on this front since. But on 22 April this year, less than a month after the A-SAT test, it was reported that the development of the first phase of India's BMD system has been completed and a nod for the deployment of "active missiles" will be given soon.

Modi's messaging was not an exaggeration, after all.

The second phase of the project is aimed at the interception of ballistic missiles with ranges up to 5,000 km and at an altitude of up to 400 km. Now, recall that during India's A-SAT test, PDV Mark-II destroyed the target satellite at an altitude of nearly 300 km and a closing velocity of 9.8 km per second. Moreover, the DRDO has come on record to say that the A-SAT missile has a range of over 1,000 km. Add to this the fact that striking a satellite requires more stringent accuracy as, at the given altitude, it travels significantly faster than a ballistic missile. Therefore, India's A-SAT test of 27 March is an indication that India has moved closer to acquiring the capability for exo-atmospheric interception of long-range missiles in their mid-course.

The mid-course phase of a ballistic missile's flight (the other two phases being boost — when the missile is thrusting to gain the velocity needed to reach its target — and terminal) offers the best opportunity for interception. Since this is the longest phase of a ballistic missile's flight, a country with mid-course interception capabilities will have relatively more time to decide and respond than one which has, say, the option of interception in terminal phase. Given that the interceptor has more time to engage, fewer interceptor sites are needed to defend larger areas. Moreover, in this phase, the missile is no longer thrusting, so its trajectory becomes relatively more predictable.

But that said, it must be noted that A-SAT and BMD technologies overlap only to a limited extent. Technologically, it is much more easier to target and destroy a satellite in orbit with an interceptor missile than it is to kill an incoming ballistic missile with it — often described as 'hitting a bullet with a bullet'. For one, a satellite in orbit moves along a predictable trajectory without performing evasive manoeuvres. For another, satellites have a relatively larger radar cross-section than a missile target, which makes their detection from ground easier. Moreover, during the A-SAT test, there were no decoys or other countermeasures to deflect the interceptor, which is unlikely to be the case, especially during a mid-course interception.

Most BMD tests conducted by India, including the latest one on 12 March, which some suggest may have actually been a failed A-SAT test — a claim DRDO has rejected — have been conducted in highly controlled conditions and the targets were electronically simulated in many cases. On some occasions, the short-range Prithvi missile has been used as the target, rather than an actual medium range ballistic missile. When the country is at war, such animated conditions will not exist. That India may have downed its own Mi-17V-5 helicopter while pushing back the intruding Pakistani fighter jets a day after the Balakot airstrike shows how blinding the fog of war is. Hence, despite success in recent years, India's BMD capabilities are not mature yet. What the A-SAT test has essentially done, in this context, is remove some doubts, even if modestly, about the effectiveness of India's BMD capabilities at higher altitudes. The A-SAT test was India's highest altitude exo-atmospheric interception ever.

BMD As Part Of India's Nuclear Strategy

Most countries which develop and deploy a BMD system suggest that it is intended towards preventing damage from enemy missiles. However, BMD systems are leaky. Consider US' ground-based midcourse defense (GMD) system, which has been tested at least 18 times between 1999 and 2017. It missed targets as many as eight times, bringing its success rate to around 56 per cent. Not to mention that these tests are performed in a highly controlled environment. Moreover, their effectiveness can be degraded by overwhelming or saturating them using a massive volley of missiles, MIRVing (mounting multiple warheads on one delivery platform) and use of decoys. Therefore, at best, missile defence systems can only limit damage to an extent.

So, where does BMD fit into India's nuclear strategy?

India has a declaratory no-first-use nuclear posture. But, scholars say, there is growing evidence to suggest that New Delhi has been developing diverse capabilities needed to pursue a more flexible nuclear policy vis-a-vis Pakistan, one that gives it options beyond countervalue targeting (that is, striking enemy's cities and civilian population) — namely, counterforce (that is, taking out enemy's strategic nuclear forces, and its command and control infrastructure before it launches its weapons).

Scholars also cite statements made by some former Indian national security official to suggest that India's nuclear strategy could be changing. One of the most recent of these statements is by Lieutenant General B S Nagal (retired), a former commander of the Strategic Forces Command, responsible for India's nuclear assets, who has argued that India should abandon its no-first-use policy in favour of "ambiguity".

To adopt counterforce targeting, India needs a set of capabilities, and US-based scholars Christopher Clary and Vipin Narang say it has been slowly putting these in place. As evidence, they point to: one, the development of more (both in terms of type of missile systems and the number of each type) and preciser delivery systems, including submarine-launched ones; two, the MIRVing of missiles, which makes striking more than one target using a single delivery platform possible; three, improvement in Intelligence, Surveillance and Reconnaissance (ISR) capabilities, including satellites which can capture imagery of 0.6- and 1-metre resolution to spot deployment of nuclear forces on the ground; four, a much more responsive command and control structure, including canisterisation of missile systems in which nuclear warheads are likely pre-mated. The BMD shield is one of these capabilities.

The debate on India's alleged tilt towards counterforce is far from over. But if New Delhi ever decides to go for a counterforce strike against Pakistan, the aim would be to disarm Rawalpindi entirely by destroying all its nuclear warheads, delivery systems and the command and control infrastructure required to use it. However, a small part of Pakistan's nuclear force escaping such an attack can't be ruled out. In such a contingency, the BMD shield would be deployed to intercept this residual nuclear force. Given that Pakistan would lose most of its nuclear force and command and control structure in such an attack, it would not be able to overwhelm the BMD shield.

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