Seeking the next frontier

India's ASAT test has not violated any norm, but it is a reminder of the need for a global regulatory regime

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Last Wednesday, on March 27, India carried out an anti-satellite (ASAT) test using an interceptor missile (as a kinetic kill vehicle) to neutralise a target satellite (possibly the Microsat-R launched in January this year) in a Low Earth Orbit (LEO) at an altitude of around 300 km. While India is the fourth country (after the U.S., Russia/USSR and China) to acquire this capability, Prime Minister Narendra Modi became the first leader to have announced the successful test in a national address. In contrast, China had quietly carried out its first successful hit-to-kill intercept in January 2007 till international reports about the consequent increase in space debris forced Beijing to acknowledge the test. France and Israel are believed to possess the capability. India's test has not violated any norm as there is no international treaty prohibiting the testing or the development of ASATs.

Keeping watch, keeping pace

After the Indian test, a senior U.S. Air Force Space Command official, Lt. Gen. David D. Thompson, appeared before the Senate Armed Services Committee (Strategic Forces Subcommittee) and said that based on public information, the U.S. had expected a test, and that a base in Colorado had tracked it. U.S. systems are monitoring between 250-270 objects of space debris that were created following the test. The U.S. will notify satellite operators in case a threat to any is assessed. He added that the debris did not pose a threat to the International Space Station, which orbits at an altitude of around 350 km.

An ASAT capability is normally a part of a Ballistic Missile Defence (BMD) programme. While a BMD targets an incoming ballistic missile, an ASAT interceptor targets a hostile satellite. Since a satellite moves in a precise orbit which is tracked, it gives greater time for target acquisition though satellites in higher orbits pose greater challenges for the kill vehicle.

Faced with Pakistan's growing missile capability in the 1990s (Pakistan acquired the M-9 and the M-11 missiles from China and the No-dong from North Korea), India embarked on its BMD programme in 1999. A modified Prithvi was to be developed as the intercept missile. Work on a long-range tracking radar (Swordfish) that could track incoming ballistic missiles to enable target acquisition was also taken up. Testing began nearly 15 years ago followed by the integration of the various systems, including the active RF seekers, fibreoptic gyros and directional warheads. In 2011, an incoming Prithvi missile was destroyed by the interceptor missile over the Bay of Bengal at an altitude of around 16 km. Another half a dozen tests have been carried out since 2011, gradually expanding the parameters of the system to enable taking on targets at higher altitudes.

Both the U.S. and USSR began to develop ASAT systems as a part and parcel of their anti-ballistic missile programmes. During the 1980s, both countries concluded their kinetic kill interceptor testing. Instead, they began to focus on co-orbital anti-satellite systems and directed energy (laser) systems which could neutralise a satellite without fragmenting it and generating space debris. With developments in offensive cyber capabilities, a promising new area is to disrupt communication links between the satellite and ground control by damaging the transponders or the power source. After the 2007 test, China too has carried out subsequent ASAT development along these lines.

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A crowded space

Since the Sputnik was launched in 1957, more than 8,000 satellites/manmade orbiting objects have been launched, of which about 5,000 remain in orbit; more than half are non-functional. Currently, more than 50 countries own/operate the nearly 2,000 functional satellites in orbit. The U.S. accounts for more than 800 of these, followed by China (approximately 280), Russia (approximately 150). India has an estimated 50 satellites. Of these 2,000 satellites, over 300 are dedicated military satellites. Once again, the U.S. has the biggest share here, with nearly 140, followed by Russia with nearly 90 and China with nearly 40. India has two dedicated satellites, one each for the Indian Navy and the Indian Air Force. Indian defence forces also use the civilian government owned satellites extensively for communications, remote sensing, and location accuracy and meteorology.

Growing amounts of space debris pose a real risk to satellites and spacecraft, as the Oscar-winning film *Gravity* demonstrated. There are over 20,000 objects of debris which are the size of golf balls while those of smaller size run into hundreds of thousands, totalling nearly 6,000 tonnes. The U.S. Department of Defense routinely tracks approximately 23,000 man-made objects achieving orbit to ensure safety of its space-based assets. One of the reasons that the international community protested strongly about the 2007 Chinese test was that it added nearly 3,000 pieces of debris as the test was done at a higher altitude (800 km), from where it would take decades to dissipate. The debris created by the Indian test, which was undertaken at a low altitude, is expected to dissipate much faster.

Patchy international control

The salience of space in defence is evident from the fact that all three countries – the U.S., Russia and China – have set up 'Space Commands'. This has given rise to demands to prevent the militarisation of space so that it is preserved "as the common heritage of mankind". The 1967 Outer Space Treaty followed by the 1979 Moon Treaty laid the foundations of the legal regime for space beginning with the rule of law, refraining from appropriating territory, non-placement of any weapons of mass destruction in space, and prohibition of military activities on the moon and other celestial bodies. However, these treaties were negotiated when the technology was still in a nascent stage. Satellite registration was introduced in the 1970s though compliance has been patchy. The U.S. has been adamantly opposed to negotiating any legally binding instrument to prevent 'militarisation of space', questioning the very meaning of the term, given that space as a medium is increasingly used for military applications.

In 2008, Russia and China had proposed a draft to kick off negotiations on the Treaty on the Prevention of the Placement of Weapons in Outer Space and of the Threat or Use of Force Against Outer Space Objects. It was rejected by the West, and not merely because it is such a mouthful of a title. The European Union, mindful of U.S. allergy to any negotiations on this issue, began to develop an international code of conduct based on transparency and confidence-building measures. The UN General Assembly has called for a declaration of political commitment by all countries that they shall not be the first to place weapons in space. This initiative too has floundered as norm building cannot take place in a political vacuum.

At present, the U.S. is the dominant presence in space, which reflects its technological lead as well its dependence on space-based assets. It therefore perceives any negotiations as a constraint on its technological lead. While countries have developed and tested ASATs, they are not known to have stockpiled ASAT weapons. Effective use of an ASAT also requires space situational awareness capability, which works best if it is a cooperative effort. India's successful ASAT test is therefore a technology marker. Further development of interceptor technology and long-range tracking radars is necessary for a robust BMD and the Defence Research and Development Organisation also needs to move on to newer technologies to enhance its ASAT capability in the coming years.

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