



The Ineluctable Outer Space for India's National Security

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Outer space, or simply space, is the void that exists between celestial bodies. This frontier of outer space is fast emerging as the fourth dimension (after land, sea and air) for military applications. Space will undoubtedly be the military high ground for warfare in the future acting as a “force multiplier” for any military operation. Militarization of space involves use of space technology for exploiting weapons on the ground and in the earth’s atmosphere with more accuracy. India has to defend her physical, economic and cultural identity in the prevalent geo-political milieu as it faces varied and complex security challenges. There is a clear and present danger that sooner or later space could be weaponized by various countries. India can no longer be immune to the rapidly changing international security environment, threat to India’s national security from nuclear and missile capabilities in its neighbourhood and the vulnerabilities of its space assets. It is therefore imperative that India exploits the capabilities of space, concurrently at appropriate levels, to achieve the desired operational capabilities in a compressed time frame. Since the early 1990s, the Indian armed forces have benefitted from the Indian Space Research Organisation (ISRO) civilian satellites. However, as operational requirements now demand an increase in military capabilities, the armed forces certainly need dedicated military satellites. This space capability has to be optimally exploited by the three services of the Indian defence forces with synergy and harmony, which is possible only under a single appropriate command structure. It is high time that India realizes: “To remain in Race, the Indian armed forces should be in Space”.

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Introduction

Acquisition of the high ground for military advantage has been a perennial feature of military campaigns. For thousands of years, military tacticians have exploited the concept of “capturing” or “keeping” the high ground in military campaigns. Fortifications were built on high points, with walls that enabled archers to rain down deadly volleys. Hot air balloons were lofted by Napoleon and during the American Civil War to observe troop movements. Aircraft revolutionized warfare during the 20th century, leading to “command of the air” as a key strategic concept. Following the shooting down of high altitude aircrafts, the quest for safer observation has gone further up: “into space”.

Outer space, or simply space, is the void that exists between celestial bodies. The atmosphere of the earth has no clearly delineated boundary and the density of atmospheric gas gradually decreases with distance from the object until it becomes indistinguishable from the surrounding environment. Beyond 100 km altitude, the thermosphere has large gradients of pressure, temperature and composition, and varies greatly due to space weather. Although there is no firm boundary where the outer space begins, the Kármán line, at an altitude of 100 km above sea level, as recommended by the International Aeronautical Federation, is conventionally used as the start of outer space.

Military Exploitation of Outer Space

Militarization of space involves the use of space technology for exploiting the weapons on ground and in the earth's atmosphere with more accuracy. Space technology for military purposes has predominantly been used since 1991 but has not been challenged either by the United Nations or by any other country. There could be two reasons for this. Firstly, satellite technology is inherently for dual use, i.e. both for military and non-military uses. Secondly, satellite is just one of the new tools that are fast replacing the various methods used for the purposes of military surveillance, communications and navigation. Also, usage of satellite technology for these purposes does not violate any international legal regime.

Furthermore, unlike the 1959 Antarctic Treaty, which requires activities on that continent to be “exclusively for peaceful purposes”, the Outer Space Treaty (OST) spells out that “space is free for exploration and use by all States, except for placement

of weapons in space.” Hence “peaceful purposes”, as the term has evolved over the years, has come to be understood as a non-aggressive means of permitting space to be used for military support functions.

The states party to the OST accept that “peaceful purposes” include military use, even that which is not particularly peaceful, and space is considered a sanctuary only in so far that no weapons are deployed there. The time has therefore come to act under the provisions of Article 51 of the UN Charter, which implies, “A state could also use military force to defend itself against hostile actions.” This, when coupled with Article III of the OST, which states, “International law and the UN Charter extends to the exploration and use of Outer Space”, ensures that a state can also undertake certain space missions to protect its sovereignty.

Although information age technologies are dramatically enhancing military capabilities in providing new means to achieve traditional military objectives, the frontier of space is fast emerging as the fourth dimension (after land, sea and air) for military applications. The military interventions in Iraq, Kosovo and Afghanistan testify to the successful defence exploitation of space-based systems. This emergence of space power is quite analogous to conventional, land, sea or air power that will mark it out not as a facet but as “the” Revolution in Military Affairs (RMA).

Space Mission Areas

Space will undoubtedly be the military high ground for warfare in the future, which would be of immense strategic and tactical utility for any military operation conducted on land, sea or air. Any specific strategic/tactical requirements by the defence forces are met by space operations comprising of five different space mission areas.¹

- (1) *Space Situational Awareness (SSA)*. It is the requisite current and predictive knowledge of the space environment and the operating environment upon which space operations depend. It is dependent on integrating space surveillance, collection and processing; environmental monitoring, processing and analysis; status of satellite systems; collection of space readiness; and analysis of the space domain. It also incorporates the use of intelligence sources to provide insight into adversary use of space capabilities and their threats to nation’s space capabilities while in turn contributing to the ability

to understand adversary's intent. It is a key component for space control because it is the enabler, or foundation, for accomplishing all other space control tasks. The SSA involves intelligence, surveillance, reconnaissance and environment monitoring.

- (2) *Space Force Enhancements (SFE)*. These are combat support operations to improve the effectiveness of military forces as well as support other intelligence, civil and commercial users. The SFE mission area includes: intelligence, surveillance and reconnaissance; integrated tactical warning and attack assessment; command, control and communications; position, velocity, time, navigation; and environmental monitoring.²
- (3) *Space support*. As the name suggests, it is the combat service support operation to deploy and sustain military and intelligence systems in space. It involves reconstitution of space, space-lift and satellite operations.
- (4) *Space control*. It refers to the combat and combat support operations to ensure freedom of action in space and denying an adversary freedom of action in space. Space control can be divided into offensive space control (both destructive and non destructive means) and defensive space control (which includes prevention, negation and protection).
- (5) *Space Force Application (SFA)*. Combat operations in space or through/from space, to influence the course and outcome of a conflict.

Weapons in Space

Gen. Joseph W. Ashy, former Commander in Chief of the United States Space Command had once said:

*It's politically sensitive, but it's going to happen. Some people don't want to hear this, and it sure isn't in vogue ... but – absolutely – we're going to fight in space, we're going to fight from space and we're going to fight into space.*³

In 1991, a study carried out by the United Nations Institute for Disarmament Research (UNIDIR) proposed the following definition of a Space Weapon:

A space weapon is a device stationed in outer space (including the moon and other celestial bodies) or in earth environment to destroy, damage or otherwise interfere

with the normal functioning of an object or being in outer space, or a device stationed in outer space designed to destroy, damage or otherwise interfere with the normal functioning of an object in the earth environment. Any other device with inherent capability to be used as defined above will be considered as a space weapon.

Space-based weapons are being considered for two categories of missions: space control and SFA. The space control mission includes protecting space assets, attacking enemy assets and denying an enemy access to space. The SFA missions include Ballistic Missile Defence (BMD) and attacking airborne or terrestrial targets. Of these, BMD has received the most attention in recent times, even more than space control.

Space weapons can be divided into three different categories namely: “earth to space”, “space to space”, and “space to earth”. Much is already known about ‘earth to space’ weapons, which basically consist of missiles capable of exiting earth’s atmosphere. However, it’s the weapons placed in the space, which are of concern. These weapons can be used against both terrestrial and targets in space. More than 5000 satellites have been launched into orbit and approximate 1000 still operate today. Because these satellites provide information and other services that are increasingly becoming critical for national security, economic vitality and human well-being, they have become vulnerable to degradation/destruction by the enemy. Any damage/degradation to a satellite is bound to have a cascading effect on the overall space capabilities of a nation.

We do need Space Weaponization

It may be worthwhile to note that whereas the land, sea and air domains are delineated in to zones where a particular country exercises its sovereign rights, the outer space is still a “global common”. Hence the use of space in any way, cannot be denied for any one. Another line of argument in favour of why the space-based weapons are inevitable comes from the fact that every global common accessed by man has eventually become a combat arena. Land that was initially used for cultivation has developed into battlefields, the maritime domain that has always been used for trade and commerce is now extensively militarized, and aerospace has too evolved from a

peaceful area to a combat zone. Extrapolating, the space domain, which is quite analogous to aerospace, could well follow the same path in times to come.

As reliance on existing space-based assets is constantly increasing for both the military and commercial needs of all nations, protecting these assets is also becoming increasingly important. This protection would gain more significance as access to space becomes cheaper and the technology needed for this access becomes more available. Protecting the space-based assets may not explicitly call for space-based weapons to effect this control but a key underlying assumption of this argument is that space-based weapons would surely be needed to do the job.

Based on the above arguments, no restrictions can therefore be placed on the development, testing and eventual deployment of weapons in space; the evolution of warfare will inevitably require placing weapons in space in order to fulfil a multitude of military roles. These roles could include defending against ballistic missile attack, defending space-based assets (space control mission) and attacking terrestrial targets (SFA mission).⁴

Should We Weaponize Space?

Although recent advancements in space technology have made it possible (at least theoretically as of now) to place weapons in space, they should not be dismissed from consideration without a thorough evaluation, for which answers to some major questions have to be arrived at. What can be done by deploying a weapon in space that cannot be achieved by an appropriate weapon on the ground or air? What are the economics of space-based weapons vis-à-vis other systems? Could deploying weapons in space force other countries to take similar steps?

Consider this ... Does protecting of assets in air/sea require a weapon to be permanently placed in that medium? Can any country in this world afford to place round-the-clock weapons in air, let alone the outer space? A point that should be understood here is that placement of weapons in space is not as simple as it seems. It can only be made possible by a very long and sustained endurance in order to acquire the relevant technological skills. It also involves an enormous cost coupled with intensive training and continuous practice to make the system work. Furthermore, weapons in space would themselves be quite exposed just like any other space-based assets and therefore in jeopardy.

A related concern is also the capabilities these weapons will confer upon other nations if they eventually emulate a deployment by one. With the technology necessary to launch satellites even now becoming widely available, the number of countries capable of deploying space-based weapons is growing. Assets that are now safe, because no other nation has a pressing need to develop weapons to attack them, will become vulnerable to attack because other nations will feel compelled to deploy space-based weapons of their own. Such an endeavour by one country is bound to start an arms race in the space.

Space Sanctuary

The above arguments convey that space should be maintained as a weapons-free sanctuary. Any decision to weaponize space should merely not be taken based on the technical and economic feasibility but various other imperatives (namely political fallouts, impact on international/domestic reactions and implications of various international treaties) should also be weighed beforehand.

The various treaties and conventions on outer space prohibit placing nuclear or other weapons of mass destruction in orbit around the earth or the moon. They also prohibit placing military installations or weapons on the moon or other celestial bodies, and declare that space is to be used exclusively for “peaceful purposes”. While peaceful purposes are never clearly defined in the treaty itself, the UN Charter defines “peaceful” purposes to include the inherent right of self-defence. As mentioned earlier, Article 51 of the UN Charter, when coupled with Article III of the OST ensures that a state can undertake space control and SFA missions to protect its assets in space.

Reliance on space is on the increase, with most nations either creating their own space-based assets or utilizing such facilities provided commercially. Considering the economic and humanitarian payoffs, it becomes quite imperative that these assets are protected at all times at all costs. Furthermore, in order to allow space to become a force multiplier during any military operation space facilities have to be provided to friendly forces along with ability to deny/degrade enemy’s space potential. Utilization of space for military gains is therefore inescapable. However, considering the economics and non-achievement of a total military supremacy, placement of weapons in space is an option that can be avoided in the current scenario.

Implications of Space Race for India

It is not a hidden fact that all nations, even those not having the capability, are entering the domain of space. A space race has almost started. Major space-faring nations have come out with their respective space policies, which indicate the direction of their space programmes and give an idea of their priorities with regard to the use of space for military and civil purposes.

The United States will not accept any limitations on its freedom of action in space, as it seeks complete freedom of action in space to fulfil its national security and foreign policy interests. It would also deny other nation's access and use of space if their activities are perceived to be contrary to US interests. Russia has traditionally opposed militarization and weaponization of space but regards space as a strategic resource to be used for societal needs, enhancement of national security and achievement of foreign policy objectives. Europe's space policy allows it to continue to develop and make the best use of world-class space infrastructure and applications, in order to stay a major player, solve global problems and improve the quality of life.

China has undertaken an ambitious space programme with military and civilian dimensions. However, its disregard of genuine international concerns about the vast amount of space debris its ASAT test created has raised doubts about its intentions to use space for peaceful purposes.

(a) A white paper issued in December 2011⁵ outlines the aims and principles of China's space programme. Following are its features:⁶

- Improving ground facilities for receiving, processing, distributing and applying satellite data;
- Expand value-added business in satellite communication;
- Work on lunar surface landing;
- Explore the properties of dark matter particles;
- Continue work on space debris monitoring and mitigation and spacecraft protection;
- Promote satellite application industry;
- Work on strengthening the national space law and improve related laws;
- Work on space industrial policies guiding and regulating space activities.

(b) Although China has not been an early entrant in the space segment, it can boast of well-planned capabilities:

- Developed various communication, broadcasting, meteorological, earth resource and the scientific research and technology experiment satellites;
- The lunar orbiter has been developed;
- For military purposes, it has a series of satellites for electronic and photographic intelligence;
- It demonstrated its anti-satellite capability in January 2007;
- Developing its own Beidou global navigation system.

Pakistan has a well developed nuclear and missile programme, which is entirely India-centric. Its nexus with China in trying to contain India will lead to their collaboration in space too. Pakistan could be expected to receive relevant space technologies or the benefit of using Chinese space-based assets, in times of peace or crisis. Satellites for remote sensing and communication are under development. However, the military potential of all satellites is debatable.

(a) The space policy in Pakistan is implemented by the Space & Upper Atmosphere Research Commission (SUPARCO). Following are the salient features of the Pakistan's space programme:

- Primary mission is earth imaging and upper atmosphere research;
- Main motive is the building of an infrastructure for both aeronautics and space research, with means at hand;
- Emphasis on multilateral cooperation with China, Iran, South Korea, Mongolia and Thailand.

(b) Although Pakistan does not possess adequate self-reliance in space technology, some of its capabilities are:

- Design and development of experimental and operational satellites;
- Operation of ground stations to receive data from Earth Observation (EO), environmental and meteorological satellites;
- Infrastructure and capability to utilize EO data for socio-economic development;
- Capacity for ground, rocket and satellite-based research in space and atmospheric sciences;

- Facilities for acquisition and processing of ionospheric and geomagnetic data.

The implication of the emerging space order for India needs to be appreciated in the context of possible threats to national security and economic competitiveness, posed by its hostile potential adversaries. These are as follows:⁷

- (a) Deployment of space technologies by hostile forces as a force multiplier in the terrestrial domain;
- (b) Possibility of such forces denying or limiting India's access to outer space and causing degradation or destruction of India's space assets;
- (c) Use of threat or the use of space-enabled technologies for conducting subversive activities or acts of terrorism involving transnational entities against India in space as well as on the ground;
- (d) Emergence of multilateral or international conventions on developing and deploying space technologies that may go against India's national interest.

India is most affected by the space developments in our neighbourhood. The utilization of space by China and Pakistan would have the following implications for India:

- (a) China and Pakistan have in place a Framework Agreement on strengthening cooperation in space technology, including collaboration in the fabrication and launching of satellites. China would undoubtedly support Pakistan in the regime of space technology, especially in the event of India being involved in a conflict.⁸ India should therefore develop its military space capabilities at the earliest.
- (b) China would soon be self-reliant in PNT services with its Beidou system projected for a global deployment by 2020. As India's reliance on the USA's GPS or Russia's GLONASS system is subject to many caveats like selective disruptions and jamming by the owners, India should hasten the deployment of its own IRNSS navigation system.
- (c) India should develop capabilities to counter China's ability to disable functioning of Indian satellites.
- (d) India should develop its own ASAT capability to act as deterrence against the destruction of its own satellites by China.

Threat Scenario

The geo-political scenario in the world is fast changing and is likely to continue to do so in the coming decades, with the world witnessing the emergence of various centres of power and India emerging as one of the leading global players. There is also a growing concern about the proliferation of Weapons of Mass Destruction (WMD) and the spread of terrorism. Energy security and the control of scarce resources are assuming trans-national proportions. The Asia-Pacific region is witnessing an unprecedented proliferation in small arms and narcotic trafficking, which in turn threatens the stability of states and societies contained therein. It is quite apparent that a huge threat looms large over India, which needs to be mitigated at all costs.

A Committee set up by the Planning Commission of India on “India Vision 2020” arrived at several factors that have consistently influenced India’s security environment in the past and that are likely to remain active for years to come. According to its report,⁹ the fundamental ideological conflict between Pakistan and India is unlikely to be resolved and territorial disputes with neighbours might not find an easy solution. On the economic front, the rising dependence on energy imports would make India increasingly vulnerable economically, as well as diplomatically. Another important forecast arrived at by the Committee is that the increasing economic and military strength of China may pose a serious challenge to India’s security unless India undertakes adequate measures to fortify its strengths.

Defending the Threats

Defending India calls for defending her physical, economic and cultural identity in the prevalent geo-political milieu as India faces varied and complex security challenges. With two disputed borders (with Pakistan and China), India has experienced four major conventional border wars besides an undeclared war fought in Kargil in 1999. India has been engaged in an externally abetted proxy war for the last several years in the state of Jammu and Kashmir, and has been combating terrorism perpetuated by militant and terrorist groups sponsored by Pakistan. At the same time, a number of insurgencies, spurred by tribal and ethnic aspirations in addition to left wing ideologies, are being tackled in various parts within the country. Furthermore, a number of nuclear weapon states are in India’s neighbourhood and it

is quite possible that hostile, radical or fundamentalist elements could gain access to and pose a threat with WMD. As regards the Indian Ocean Region (IOR), the Sea Lanes of Communication (SLOC) need to be secured at all time.

It is in such an environment that the Indian Armed forces are required to fulfil its role, in varied operating conditions and across the entire spectrum of current or possible conflicts. To address the above-mentioned threats, India as a nation should aim at building and maintaining good relations with all South Asian and neighbouring countries. Considering the threat scenario on India, the following military objectives need to be maintained at all times:

- (a) Maintain strategic and tactical influence over the IOR and protect the SLOCs;
- (b) Carry out an all-time continuous surveillance of India's borders and the IOR;
- (c) Continuous surveillance over Area of Influence;
- (d) Surveillance when required, over Area of Interest;
- (e) Obtain near real time information in the Area of Interest;
- (f) Deter and defeat attack by any adversary on India's borders;
- (g) Be prepared to counter threats of neighbouring countries involving WMDs;
- (h) Maintain "favourable space control" over the Indian peninsula while operations are being carried out;
- (i) Counter terrorist threats along the borders and within the country;
- (j) Be prepared to provide humanitarian support, disaster relief and aid to civil authorities to all nations.

In the current scenario, to achieve all the above objectives through conventional means is a difficult if not an impossible task. However, utilizing space as a military tool would surely help the Indian Armed Forces in achieving the objectives set thereupon.

Space Utilization by Indian Armed Forces

Space is now being increasingly used to further military purposes of many nations and there exists a clear and present danger that sooner or later space could also be weaponized. The Indian armed forces therefore cannot remain immune to the rapidly changing international security environment, the emergence of space order, threat to

its national security from nuclear and missile capabilities in its neighbourhood and last but not the least, vulnerabilities of India's own space assets.

Prior to the 1990s, India's armed forces showed little interest in the utilization of space assets.¹⁰ However, with the 1991 Persian Gulf War's aftermath, the Indian parliament's standing committee on defence recommended the creation of an aerospace command, which sadly received little attention from the defence ministry until the outbreak of the Kargil War against Pakistan in 1999.¹¹ The need for independent reconnaissance assets became immediately apparent during the war when India had to depend on the commercial IKONOS satellite for information.¹² Similarly, during the 2008 Mumbai terror attacks, Indian security agencies found themselves unable to listen in on real-time conversations between the Mumbai attackers and their Pakistani handlers due to the lack of independent signals intelligence capabilities. Both events highlight the significance of developing dedicated military-specific space assets.

The time has now come that "space technology" is ushered in as the new RMA for the Indian armed forces. The future success of ground, sea and air forces would be critically dependent upon the effective utilization of space assets and capabilities across the spectrum of conflict. The advent of space-based systems has added a fourth dimension to modern warfare and it is imperative that the exploitation of space is done concurrently at appropriate levels by all the three service arms (Indian Army, Indian Navy and Indian Air Force) to achieve the desired operational capabilities in a compressed time frame.¹³

Keeping current developments and future prognosis in mind, the Indian armed forces have to continue working towards establishing "net centricity" and bettering their C₄I₂SR capabilities, as it is the first step towards a network centric warfare. Needless to say, interoperability among the three services would be the essence of effective networking centric capabilities.¹⁴ This can best be undertaken by effective utilization of the space-based infrastructure, which offers a common platform for integration of all tri-service requirements.

Threat to Indian Space Assets

Space is yet another type of medium like the land/air/sea, wherein construction of civil infrastructure is resorted to for further utilization to meet military goals, e.g. the off shore oil rigs set up by Oil and Natural Gas Commission (ONGC) are primarily

for civil use but also have a military implication. These assets are potential strategic targets, and so have to be protected at all costs. Along similar lines, all of India's assets in space form an integral part of the defence mechanism and so have to be always protected from all types of threats.

The Indian armed forces is the "net security provider" to the nation. Amongst its defined defensibles, it also needs to protect India's space assets. But are they prepared for that? The following hypothetical scenarios have been built in order to highlight likely emergencies and threats to India's space security and to reflect whether India is ready to respond in an effective and timely manner.

(a) The Indian RISAT Satellite is destroyed by a ground-based missile.

- Could India have prevented it?
- Could the attack have been detected in a timely fashion?

(b) Jamming of Indian IRNSS Satellite leads to disruption of signals.

- Can India pinpoint the culprits?
- Can India jam the opposing country's satellite?
- Can India avoid getting its satellite jammed?

(c) Debris generated from a satellite's destruction hits an Indian GSAT satellite.

- Can India identify whose debris hit its satellite?
- Can India claim compensation?

(d) India is blamed by China for causing damage to its satellite of the Beidou system.

- Can India handle the claim?

(e) Terrorists attack and destroy India's ground-based facility at Satish Dhawan space centre leading to disruption of services.

- What will be India's response to ensure the act is not repeated?

(f) An Indian dysfunctional satellite damages a European satellite.

- Can India bring down its dysfunctional satellite as the USA did with one of its satellites?

- (g) India is in need of legal and diplomatic expertise.
- Who in India is competent enough to provide it?
- (h) The USA stops providing signals from its GPS satellites.
- Can India ask for compensation?
 - What happens to all the weapon platforms using this technology?
- (i) India conducts an ASAT test on its own ageing satellite.
- Can it justify the same to the international community?
 - Is it able to undertake retaliation?

The Indian Space Command

The above scenarios indicate that a single window mechanism should exist to provide solutions (civil and military) to all the perceived problems related to space. Hence the formation of an Indian tri-service “space command” assumes utmost significance. There is no denying the fact that the space command would be a force multiplier and game changer for Indian armed forces, and for India it would be a hedge against the forces bent upon challenging the territorial integrity of the country. The primary objective, however, of the Indian space command would be “ensuring free access to space while denying the adversary the advantage of using space platforms in the event of a war”. More importantly, in the backdrop of India’s declared national policy of no first use of nuclear weapons, it could provide advanced warning of an impending nuclear attack. Other well identified goals of the proposed Indian space command could include giving out missile launch warnings and also monitoring the launch of enemy satellites.

The present IAF chief Air Chief Marshal N. A. K. Browne too has opined that a need for having a tri-service space command to look after the military issues related to space is essential. This is what he had to say on the subject issue:

*Time has come that we look into the realm of an aerospace command. It would be a joint command where all the three services have to put their hands together.*¹⁵

Although the demands of a Space Command has probably not yet found justification with the South Block, the Indian government has approved the expansion of strategic and tactical-level operational demands of the armed services by instituting the Integrated Space Cell (ISC) within the Integrated Defense Staff in February 2008. Correspondingly, a dedicated organization has also been created in all the three services headquarters to deal in spatial issues peculiar to each service. The National Technical Research Organisation (NTRON) at the national level, Defence Image Processing and Analysis Centre (DIPAC) and Defence Satellite Control Cell (DSCC) at the tri-service level complete the broad organization related to the military utilization of space.

Addressing the Unified Commanders' Conference on 10 June 2008, the Defence Minister Shri A. K. Antony had said that India was in favour of utilization of space for peaceful purposes and remained committed to the policy of non-weaponization of space. He also said that the ISC would act as a single window for integration among the armed forces, Department of Space (DoS) and ISRO.¹⁶ In written reply to a question, Shri A.K. Antony told Rajya Sabha that "though the Satellite requirements of the armed forces were being met from the existing facilities, steps had also been taken for provision of dedicated satellite facilities for the armed forces."¹⁷ Towards the same, GSAT-7, the dedicated satellite for Indian Navy, was launched on 30 August 2013 and is operational to date. It is expected that a similar military satellite could also be made available for the Indian Air Force in the near future.

Eventually, the success in the futuristic battle strategy depends much on exploiting the resources of a well-endowed space command with both defensive and offensive components. In addition to exploiting the "final frontiers" and sharpen the country's combat edge, the space command would also be crucial to expand the strategic reach and strike capability of the Indian armed forces by a substantial extent. And on its part, India cannot afford to delay the formation of this space command.

Space for India: Way Ahead

India is not a very rich country and hence does not have the luxury to own dedicated "user-specific" satellites. A lot of development has already taken place with ISRO being the fore and only runner in the field of space research and implementation. Space capabilities for defence could therefore be built upon as an extension of the already existing Indian space programme, thereby enabling affordability and optimal

utilization of resources. Capacity building and resource utilization should be done in consonance with the requirements of the three defence services and Defence Research and Development Organisation (DRDO) with ISRO. Requirement of other agencies like National Intelligence Agency (NIA), Intelligence Bureau (IB), NTRO, Research and Analysis Wing (RAW) etc. could also be dovetailed.

As India is not a global player, it needs ascendancy only in the regional context. However, capability of the space assets needs to be created to handle all fronts together. Needless to put it, India's defence space strategy should primarily be aimed at safeguarding Indian's security interest. The existing space assets should be utilized and future space technologies proposed, for accomplishing all peculiar military operations undertaken by the Indian armed forces.

India also needs to enhance its conventional military prowess by harnessing available space capabilities and potential, to comprehensively reciprocate to the spectrum of warfare being directed towards it and also limit (if not deny) India's adversaries the opportunity to offset conventional military superiority by resorting to threats of WMD, or other forms of unconventional warfare.

Protecting India's Space Assets

Dr V. K. Saraswat, former Director General of DRDO and Chief Scientific Adviser to the Indian Minister of Defence, has said on various occasions; "We don't believe in use of space for warfare. Our philosophy is to use it only as resource"; "We have to make sure that our assets are protected and access is not denied. DRDO has a programme to protect our space based assets and to ensure continuity of access there". In one interview,¹⁸ he had stated that "The country does not want to weaponize space but the building blocks for an ASAT weapon were in place which required a little fine tuning".

"Our satellites are vulnerable to ASAT weapon systems because our neighbourhood possesses one", former Indian Air Force Chief Air Marshal Naik said. He had underlined the need for India to develop ASAT technology and referred to it as "one of India's challenges of future war capability."¹⁹

In response to the Chinese killer satellite test held on January 2007, the then chairman of ISRO, G. Madhavan Nair had stated that though it was well within the capability of India to develop and deploy a system to knock down a rogue satellite, India's concern was to keep outer space a zone of peace and tranquility.²⁰

As of now, no known protection measures have been undertaken to secure India's assets in space. Although an ASAT attack by a hostile entity against our space capabilities may not cause a significant dent in our military capabilities, it would surely create an enormous dent on our economic capabilities. Apart from threats of ASAT warfare, even in case of less debilitating scenarios like penetration of communication, there is little that could be done to secure our assets. This is bound to cause enormous political and administrative difficulties if such attacks are not mitigated.

In view of the foregoing, our overwhelming emphasis should primarily be towards force-enhancement missions and also towards passive counter-space defence in order to secure our assets in space. Though India may declare "No first use" for the ASAT system (akin to India's nuclear policy), this capability would surely act as a deterrence for any misadventure against India's space assets by a hostile state.

Furthermore, the Kinetic Attack Loitering Interceptor (KALI), Directionally Unrestricted Ray-Gun Array (DURGA), etc. envisaged earlier could now see the light of the day by circumventing prevailing legalities, technological and monetary challenges. The endeavour should be to plan for and build capabilities within the existing capabilities and limitations.

Conclusion

Due to the "peaceful" charter of ISRO, it cannot be openly allowed to enter into the military domain with the fear of facing international sanctions. However, since the early 1990s, the Indian armed forces have benefitted from the ISRO civilian satellites by using satellite imagery. The operational requirements now demand an increase in military capabilities, which can be best met by providing dedicated satellites for military purposes.

Today, boasting of a successful launch of 'Mangalyaan' - the Mars Orbiter Mission, India stands tall in matters of space; we should be second to none in the exploitation of space options for our nation-building, through defence or non-defence applications. Furthermore, the compulsions of national interests would endorse the approach that capabilities for defence should not be divorced from the economic and commercial uses of space. These need to be regarded as challenges to be overcome jointly in the larger national security interests, rather than permanent obstacles in building up our military space capabilities.

The advent of space-based systems has added a new dimension to modern warfare and it is imperative that the exploitation of space is done concurrently at appropriate levels, to achieve the desired operational capabilities in a compressed time frame. Commensurately, the Indian defence forces should prepare themselves to exploit the outer space by defining a road map for the same. This can be best done by establishment of a tri-service “space command”, which may also be a necessity for handling all space-related issues. Someone has aptly worded the importance of space to realize that “To remain in Race, the Indian armed forces should be in Space”.

Notes

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