



SPACE CONTROL -THE NEXT STEP IN INDIA'S SPACE JOURNEY



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India's space programme is deeply rooted in a scientific backdrop since its inception and oriented towards benefits to civil society. The National Space Commission formulates the space policies and DOS implements these programmes through, mainly, Indian Space Research Organisation (ISRO) and other complimenting organisations, to promote the development and application of space science and technology for the socio-economic benefit of the country. ISRO has been a centre of excellence in India's space journey and has proven itself time and again in satellite and launch technology. India is now in the league of space faring nations with a positive growth trajectory. The dependence on space for improved lifestyles and military functioning is growing in unimaginable ways. As a corollary to the civil and military dependence on space it can be said that absence of satellites or information provided through satellites for even a few hours can cause panic and throw life out of gear.

India has largely been limited in its space involvement to the three most basic areas of space missions -fabrication of satellites, launch vehicles (rockets) and monitoring and tracking of satellites. The inherent utility of satellites and the dual-use conundrum has also seen the increase in a space utilisation category that includes all space operations aimed at increasing the effectiveness of military operations, on ground, in sea and in the air. This has become a vital aspect of space operations. These space operations have traditionally been acceptable in the international space community, with no sensitivities attached. As India is poised to deploy more and more satellites every year and relies extensively on them for military applications of the future, it will only be a matter of time before our adversaries are tempted to challenge our freedom of operation in space.

When the space capabilities represent an easier target than other critical nodes, interference with them becomes a possibility. The natural consequence of space integration into military activity is

a more hostile environment for space. Social and economic dependence on space coupled with military dependence makes space a 'Centre of Gravity'- a target which can influence the course of a conflict. Protection of space assets through '*Space Control*' is hence a vital necessity. The most compelling reason for moving forward with at least the essential elements of a space control capability is China's growing capability in anti-satellite systems and India's increasing dependence on space, both economically and militarily.

Passive conflicts in space carry the benefit of no casualties or damages to infrastructure on ground. Public sentiment and international political pressure can thus be dispelled. The gravest threat in the near term could be for satellites being incapacitated or destroyed by a major electromagnetic pulse (EMP) radiation by a hostile force in orbital space. A lower level of potential destructiveness might come in the form of a ground-based laser attack that could cause irreparable damage to the satellites or cause some interference of consequence. A particularly glaring vulnerability is the constellation of Global Positioning System (GPS) satellites and our extraordinary dependence on the GPS system presently, atleast till the NavIC becomes operational. GPS presents a uniquely attractive target because the signal is faint and highly susceptible to jamming. Cyber attacks on the satellite information systems pose another emerging area of threat.

A possible option to obviate such attacks is to install threat-warning sensors on future satellites to detect, identify, and classify attacks of various sorts. This will have to become a basic requirement for satellite security and private satellite manufacturers will have to understand the requirement, despite the additional costs involved. In the existing scenario, a satellite failure could be the result of cosmic radiation, a technical malfunction, a collision with space debris, or a deliberate attack, whether physical or electronic. Threat-warning sensors would not only provide an advance warning and threat classification, but will also give an opportunity to take preventive action by manoeuvring the satellite to safety. Other measures include hardening and shielding against radiation and the use of such means as data encryption and electronic countermeasures. Hardening of satellites and other on-board protection means offer an interim protection against potential threats. However, these measures are expensive and can be countered by a determined attacker. Threat-warning sensors are an emerging technology and thus present an opportunity for India to be a pioneer in the field of satellite protection.

Space Control would comprise of three essential activities: space protection, space denial and space situational awareness. While space denial is the offensive capability in terms of anti-satellite capabilities, space protection and space situational awareness are the defensive and hence more

desirable forms of space control. With the passive counter-space alternatives like ground-based lasers, space jamming capabilities, and proximity microsatellites gaining centre stage, India needs focussed attention towards space protection and space situational awareness, which would be the first step towards space control. Better space situational awareness depends on space surveillance capabilities. A network of ground and space based systems to monitor orbital objects is a pre-condition for any significant space control capability. Coupled with this is the installation of threat-warning sensors on satellites for enabling basic space protection.

Space control will become ever more important as our economy becomes more reliant on space. India should be spending resources and intellectual capital on acquiring basic space control capabilities as the next step in space. Indifference to this critical aspect of space security could result in a stunningly rude surprise in times of crisis.

(Disclaimer: The views and opinions expressed in this article are those of the author and do not necessarily reflect the position of the Centre for Air Power Studies [CAPS])

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