Race for Space: The Battle of the Ultimate High Ground

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Abstract

Outer space is considered to be final frontier of mankind and the ultimate high ground for war fighters. Outer space, as a domain for the Next Generation Warfare (NGW), has gained substantial prominence in the foresight of militaries over the last two decades. The biggest challenge is to integrate space assets into defence architecture in a seamless fashion.

Role of outer space in national defence and security is significant and expansion of space capabilities is a crucial component of successful military operations. The outer space turf is explored in varied integrated diverse capabilities in offensive and defensive activities.

Outer space, as NGW, leverages sophisticated technology to manipulate space and time. Keeping in view the advancement in the field of Satellites and Outer Space, employing space and time to optimal military advantage is the need of the hour. Outer Space has clearly emerged as the ultimate high ground and is now a crucial element in Command, Control, Communications, Computers, Information, Intelligence, Surveillance and Reconnaissance (C4I2SR) for all three Services. The ability to harness space power will be critical to victory on the future battlefield.

Background

Once seen as the exclusive realm of superpowers, outer space is becoming affordable for an increasing range of actors. However, like the cyber domain, outer space, too, is becoming more crowded, contested and competitive. Driven by national ambition,

geostrategic tensions and growing economic prospects, space proficiencies are developing at an astounding rate. This is a truly exciting time to be in the space sector but the implications of the new space race may have far reaching consequences.

Outer space strengthens nation's way of life in peacetime and provides critical war fighting abilities during conflict. Space capabilities, therefore, are becoming essential for national development, economic wellbeing, commerce and everyday life, besides assuming a crucial component of successful military operations. Moreover, in the future, whoever has the capability to control space will likewise possess the capability to exert control on the surface of the earth. In fact, space is promising as a military and economic Centre of Gravity (CoG) for information reliance, society, business and military forces. In short, life on earth is becoming inextricably linked to space.

Introduction

Outer space is considered to be the final frontier of mankind and the ultimate high ground for war fighters. Outer space, as a domain for the NGW, has gained substantial prominence in the foresight of militaries over the last two decades, being an area of intense focus to sustain strategic lead and to counter the possibility of a 'surprise attack' from space. As things stand, the biggest challenge is to integrate space assets into the defence architecture in a seamless fashion and to prepare for the space war, if pushed to exercise the option.

Importance of space in national techno-economic, social commercial and military strategic life has promptly emerged during the past two decades. India, itself, has a strong space programme which is primarily focused and headed for scientific and developmental goals. This, in itself, enhances exposure for our country to any aggressive and antagonistic action that might seek to harm, degrade or deny space potential so meticulously built up over decades at great cost against great odds. India's dependence on space for vital economic purposes has been growing rapidly during the past decade or so.

NGW

Role of outer space in national defence and security is significant and, thus, expansion of space capabilities is a crucial component of successful military operations. The outer space turf is explored in varied integrated capabilities in offensive and defensive activities like communications, navigation, precise positioning, early warning, electronic warfare, target analysis, threat assessment, situational awareness, Battle Damage Assessment (BDA), intelligence, surveillance, reconnaissance, coverage over denied areas, combat assessments, mission planning, terrestrial and space environment monitoring.

All conventional and traditional military missions are gradually relying more and more on support from outer space, thereby strengthening the theory that space systems affect every nuance of military operations including effective integration of battlefield.

Outer space, as NGW, leverages sophisticated technology to manipulate space and time. Keeping in view the advancement in the field of Satellites and outer space, employing space and time to optimal military advantage is the need of the hour. Enemy can be deprived of the information needed to position his assets and carry out an attack or effectively respond to an attack.

Centre of Gravity (CoG)

Global trends point that space is more and more becoming an economic CoG, the loss or degradation of which would cripple commerce, finance and numerous other private and public activities. Various multifarious activities deriving direct or indirect economic and commercial benefits related to outer space are efficient communication technology, positioning and navigation, voice, video, data (email / internet), space based industries, space tourism, resource mining, public-private partnership in International Space Station cargo service, environmental explorations, expansion of human experience, human space transportation and habitation.

Space exploration stimulates both tangible and intangible benefits for humanity. Tangible benefits include innovation related applications and financial gains resulting from investments in these programmes. In addition, outer space exploration leads to advances in science and technology and promotes workforce development and industrial capabilities, leading to an overall stimulation of industries,

all of which contribute significantly to the economic progress of space faring nations.

Space exploration also results in intangible benefits such as enriching of culture, inspiring citizens and building mutual understanding as a result of international cooperation among space faring nations.

Convergence of National Interests

Use of space will become increasingly vital for national interest for India. Space is the 21st century's high ground impacting on everyday lives of human beings and playing a crucial role in human development activities. Its role in the national defence and security is equally crucial.

As we move forward in 21st Century, it is certain that outer space will become another medium of warfare besides assuming the important role of protecting the country's commercial assets. Developments in space capabilities and resources are clear evidence that this phenomenon is no longer limited to a handful of developed industrialised countries. The United States would undoubtedly remain the leading space power for many decades to come. We need to acquire capabilities similar to that of the United States, or for that matter, other industrial states. But if China is seen as a point of reference in Asia, one finds that it is rapidly emerging as a space power and its capabilities may also be placed at the disposal of other countries for strategic and commercial reasons.

Military Significance of Satellites

Satellites are the focus of military space activities and are widely used to provide support for military or security related activities. They are also increasingly used to provide direct support for military operations. According to United Nations Office for Outer Space Affairs (UNOOSA), till end 2019, 8378 objects have been launched in Outer Space, out of which there are 4994 still in orbit with nine countries having indigenous space launch infrastructure and capability. Satellites are increasingly 'dual-use', i.e. can be used for both military and non-military purposes.

The risk of a space Pearl Harbour is growing every day. Yet, this war would not last for years rather it would be over the day it starts. Without our satellites, we would have a hard time regrouping and fighting back. We may not even know who had attacked us, only that we will be deaf, dumb, blind and disorientated.

Role of outer space in national defence and security is decisive, making space capabilities essential for success of military operations. All conventional military missions for land, sea and air are progressively relying on support from outer space based platforms and satellites. The military uses of space continue to expand as the arrival of newer technologies affords greater scope for exploitation. Reconnaissance, surveillance, warning, communications, weather and, most recently, navigation satellites were designed and deployed to serve national security needs. Significant military applications, through exploitation of outer space, are enumerated below:-

(a) **Tactical Battle Area (TBA).** Provide operational and tactical coverage over the entire depth of the TBA.

(b) **Observe, Orient, Decide, Act (OODA) Loop.** Enables a military commander to execute observation, orientation, decision and action phases of the process in an optimised manner.

(c) **C4I2SR Systems.** Allow fusion of data from multiple sources to be able to produce a comprehensive intelligence picture dealing with all aspects of information.

(d) **Space Reconnaissance Systems (SRS).** Space warfare will be an attack on space based reconnaissance systems coupled with attempts to protect these platforms from destruction.

(e) **Engagement of Targets.** Space based systems are becoming new CoG for the enlarged battle space.

(f) **Anti Satellite (ASAT) Missiles.** These missiles are designed to destroy satellites.

Security Imperatives

Space based advantages for national security and defence imperatives are the need of the hour. Military derivatives of civilian programmes are increasingly becoming obvious because of dual use technology. Deliberation on space doctrine on national security is

imperative because space is no longer an esoteric medium and military relevance of this domain is becoming increasingly germane to victory in war since it can harness synergies that function as significant force multiplier.

To derive full advantage, adaptation of existing national space apparatus can be the starting point and threshold for specificities. The defence applications achieved by other space powers can provide footprints to follow and lessons learned from the experience of space pioneers can provide a road map to progress. However, the first step in achieving a viable military space capability is to articulate new direction for space policy and to introduce this concept in military doctrines with detailed modalities.

Revolution in Military Affairs (RMA) in Space

Today, technology is an essential component of operation of weapons, tactics and even higher level domains of human activity, such as strategy and decision making. These increasingly rely on speed and near real time situational awareness. Precision guided bombs, cruise missiles and missile defences all depend on satellite generated information. The modern, digitally enabled, armed forces are able to react quickly, project power across great distances and conduct highly lethal conventional operations with precision and a high degree of situational awareness.

Even as India continues with policy of non weaponisation and peaceful uses of outer space, the growing trend towards weaponisation in its neighbourhood and in the larger global context are beginning to cast influence on India’s orientation as well. Making a distinction between India’s civil and military space needs has been borne out of necessity rather than choice. It is now equally necessary for India to delineate its space programme into civilian and military components with clear cut institutional architecture and better financial allocation ensuring its progressive growth. The delineation of the space programme will also serve to promote greater transparency, which would further India’s role and standing in the international system.

C4I2SR Systems

Intelligence plays the most prominent role in decision making process of any nation or organisation. Increasingly large volumes of information need to be processed to filter out meaningful intelligence. The aim should be to obtain data from multiple sources to produce comprehensive intelligence picture dealing with all aspects of information. During the past few years, due to development of situational awareness technologies, the associated C4I2SR systems are increasingly becoming space based.

Space Based Defence

In addition to defensive measures, space warfare requires development of aggressive means to destroy or counter space warfare capabilities of other countries. The major categorisation of aggressive means is:-

(a) **ASAT Weapons.** ASAT weapons are developed to counter enemy military satellites, and protect own satellites.

(b) **Direct Strike Weapons (DSWs).** DSWs enable attacking selected targets with accuracy for high probability to kill, with low collateral damage.

(c) **Directed Energy Weapons (DEWs).** DEWs can be broadly defined as systems that produce a beam of concentrated electromagnetic energy, or atomic or subatomic particles, which are used to incapacitate, injure and kill people, or to incapacitate, degrade, damage and destroy objects.

(d) **Particle Beam Weapons (PBWs).** PBWs are actually miniaturised particle accelerators consisting charged particles of electrons, positrons, protons or ionized atoms, used for military purposes for destroying targets. They possess advantages over other anti-missile devices including laser weapons. In order to destroy a target, a particle beam weapon is supported with high energy, strong current and moves at very fast velocity.

(e) **Orbital Kinetic Energy Weapons.** The space based orbital kinetic energy weapon system includes a satellite having control system configured to maintain an orbit in outer space around the earth and to re-orientate the satellite on a desired trajectory corresponding to an earth based target. The projectile strikes the earth based target delivering its kinetic energy.

(f) **High Altitude Nuclear Detonations.** To create atmospheric shock wave, through nuclear explosion, to divert asteroids on a collision course with earth. The effects would be radiating heat and vaporising parts of asteroids surface facing the explosion.

Conclusion

Intelligence is of great importance, but good quality intelligence can often be hard to come by. Outer space has emerged as a new medium and there is an urgent need to enhance awareness regarding specific space issues. Outer space also serves as a major catalyst for socio-economic development and techno-economic competitiveness. Outer space capabilities are indispensable for aspirations of a progressive country. The future success of ground forces will be critically dependent upon the effective utilisation 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, to achieve the desired operational capabilities in a compressed time frame.

Space discoveries have been attempted at the moon, being the closest cosmic body, with *Chandrayan 2* Mission. It appears that the moon will provide us the test bed to discover technologies required for deep space missions. Also, with upcoming *'Mission Ganganyaan',* with Indian Air Force crewed space mission in the Low Earth Orbit, a gargantuan thrust would be provided to capability of expanding human knowledge whilst understanding the discoveries in the Outer Space domain.

Outer Space has clearly emerged as the ultimate high ground and is now a crucial element in C4I2SR for all three Services. The ability to harness space power will be critical to victory on the future battlefield, especially as information dominance becomes more pervasive in the ensuing evolution of Network Centric Warfare.

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