Is India Prepared to Exploit the Opportunities Offered by Space? An Assessment

Introduction

Gulf War of 1990-91 has demonstrated a radical change in military strategy. Aided with better technological wherewithal, US and its allies dominated and destroyed the Iraqi strategic hubs such as staff, radar stations, and networks. Once Iraqi command and control was irreparably damaged, its war fighting potential fell apart. After the Iraqi war, a new paradigm based on the net centric warfare came into being. Net Centric Operations are reliant on the space to some degree ranging from satellite communication, space derived imagery, navigation and targeting provided by the Global Positioning System. These are critical to the Armed Forces to deliver a specific effect at the time and place of their choosing through synchronised effect operations across the air, land, and sea.

Consequent to the gulf war U.S. Defence department created a global network of interconnected network and sensors called the Global Information Grid (GIG) which was to be used for resource coordination and mobilisation. It has now emerged a real lead player in exploitation of space.

India's space programme began as a means to assist India in its development, therefore, it has mainly focused on improving the everyday lives of its citizens. However, external environment particularly in the neighbourhood has lead India to have a re-look on its space policy. While the space programme still remains mainly focused for the space exploration and civilian use, its military applications are also been taken note of particularly in view of growing threats to our space assets from hostile actions of some inimical powers in our neighbourhood.

This change has come about after Chinese A Sat test in Feb 2007. Consequent to this, in year 2008 a Space cell in the Integrated Defence Staff (IDS) was established. Later, during the Naval Commanders' Conference in 2009, Defence Minister, Mr. A K Antony declared that in early 2010 a satellite dedicated to the Navy to boost its connectivity over sea would be launched. This was to be followed with similar satellite launches for the Air Force and the Army. Naval satellite however, is still to be launched. The real reason is not known but it may have to do with our lack of suitable launch vehicle which can launch heavier satellites.

More recently, MoD has announced to replace the space cell with a full fledged tri-service Aerospace Command to look after the need of the defence forces. The fact that we have finally acknowledged the need to exploit space assets for the defence is most appropriate needs no confirmation. The delay in accepting this reality in long run could turn costly not only for the defence but even for the continuance of most civil services needed for day today facet of our life. Therefore, while we enhance use of space assets for defence, we also need to ensure their protection from disruption of civil services by instituting appropriate measures as well as from targeting by inimical powers in our neighbourhood who may resort to hard and soft kill measures.

Why Space Technology is Crucial to our Military?

The 1991 Gulf War, the 1999 NATO bombing of Yugoslavia, the 2003 invasion of Iraq and ongoing ISAF/United States war against Al Qaeda in Af-Pak region have more than proved the importance of space assets

for efficient execution of the military tasks namely, net centric warfare viz. situational awareness, tactical control, employment of UAVs, navigation and targeting and free flow high speed data/ Communication and real-time situational awareness to the forces which is absolutely necessary for decision taking in fast moving battle thus it is an efficient tool to achieve force multiplier effect more particularly in performing joint op in coordination with the sister services.

In acceptance of this reality, US space policy 2006 considers space capabilities vital to its national interests. Hence, it seeks permanent space dominance, including the right to deny any nation the use of space if its actions are hostile. United States have 122 military satellites in the space nearly ¾ of world military satellites in the space. Similarly, a number of countries are exploring and acquiring capabilities to counter, attack, and defeat space systems. United States and erstwhile Soviet Union and china have already displayed their Space offensive capabilities. Others nations realising the accruing benefits of space are likely to follow the suit.

New Developments

Further new developments continue to take place in the field. Already United States have tested Boeing designed X37B an Orbital Test Vehicle (OTV) which is an experimental test programme to demonstrate technologies which are expected to blur the dividing line between atmosphere and space. The vehicle could stay in safety of space for long time and will swoop down to the earth atmosphere, complete its assigned mission and revert to its holding height. In essence, it is a manoeuvrable satellite which with its capability could be used as space bomber and even to tamper enemy satellites. In first X37B launch it returned to the earth after a stay of 270 days in the space. The most recent launch of X37B which took place in 11 Dec 12 is expected to last several months in the space. The mission is classified and is under control of Defence Advanced Research Project Agency (DARPA). India can not remain untouched from these developments and must prepare to face the future challenges from the space.

Militarisation v/s Weaponisation of Space

Since the beginning of the space era, the world community has strongly endorsed the use of outer space for "peaceful" purposes. Although the term appears in many UN documents and space law treaties, the term "peaceful" still lacks universally accepted definition. But not all countries can be relied upon to pursue exclusively peaceful goals in space. A common interpretation of the term "peaceful" in relation to outer space is now considered to mean "non-aggressive" rather than "non-military." A communications or reconnaissance satellite though provides a force multiplier effect in warfare with enhanced tactical situational awareness and resultant better command and control but, it cannot be classified as a weapon as it is in a war supporting role and don't technically violate the international law on the space which forbids placing of nuclear and conventional weapons of mass destruction. Similarly, transit of ICBM through the outer space on track to its targets in other continents or attacking a satellite may come in the ambit of space warfare but do not constitute the weaponisation of space. A number of countries are thus exploring and acquiring capabilities to counter, attack, and defeat space systems. Russia and China while opposing the United States are at the same time trying hard to catch up with the United States as well as are pursuing for enactment of international treaty against weaponisation of space.

Threat to Indian Space Assets

India can hardly avoid taking these developments in account particularly in view of our inimical neighbours who have joined hand and can act against the against the Indian Interests.

China. Our immediate neighbour China too is focused on developing capabilities in Network Centric Warfare (NCW) which it terms as informationised warfare. It had made strides in space and its capabilities extend to moon mission, establishment of international space station, its own dedicated GPS, Beidou and manned space flights. In fact, its fifth manned flight is in the space with crew of two men and one woman cosmonaut. In the span of 15 days of the mission the space craft Shenzhen 10 will dock

twice with china space laboratory 'Tiangong 1' which is in the space since Sep 2011 (automatic and manual docking). These developments confirm China's growing military space prowess. While China does not acknowledge its military applications of space voyage but, it is difficult to believe since China's space activities are driven almost entirely by the People's Liberation Army and most of the space-technology advances could have military applications as its A-Sat test has shown and it continues to develop other military applications and technology designed to destroy or disable satellites. (ASAT, Jammers /Directed energy weapons) It has launched its own GPS BeiDou (Compass) its home-grown satellite navigation which now consists of 16 operational satellites that cover Asia-Pacific region from Australia in the south to Russia in the north. All these developments portend security implications for India.

Pakistan. Pakistan does not by itself threaten our satellites but, does so in collusion with China, it's avowed all weather friend. Therefore, it would be fair to assume that similar to the past transfer of nuclear, missile and defence technology to Pakistan, China's entire space capability/ facilities would be accessible to Pakistan. Even otherwise, China and Pakistan have 20 years of Co-operation in space and its current Satellite Pak sat-IR was assembled and launched by China's Great Wall Industry Corporation (CGWIC). To undermine our interests, China is similarly engaged for space launches for our other neighbours viz: Sri Lanka, Bangladesh and Maldives. All these are not innocent economic ventures but have strategic implications for India. Therefore, why ISRO despite its long experience and proven capability is not able to assist our neighbours in their space quest needs examination? During the recent visit of Pakistan by the Chinese PM, Pakistan has concluded an agreement to use Chinese GPS BeiDou over preference of American GPS which its strategists believe will not be available during war. Pakistan is the fifth Asian country to use Chinese GPS. Pakistan is also member of Asia Pacific Space Co-operation Organisation (APSCO) which is setup and chaired by China to meet its strategic need such as this, only highlights that India would need its own Navigational system for the similar reasons. The first launch of indigenous seven satellites based, Indian National Regional Satellite System (INRSS) is planned shortly (first satellite was launched on 1 July 13). The launch of seven satellites will complete by 2015. The system would cover 1500km beyond our land borders/coastline and would be accessible to both civil and service subscribers.

Pakistan Space & Upper Atmosphere Research Commission (SUPARCO) is controlled by the Military and has a serving military officer of three star rank heading it therefore, gives credence to the military orientation to their space programme. Last but not the least, the Space programme-2040 has approval of Pakistan's National Command Authority hence, shows its strategic leaning unlike India whose Space programme is meant to meet the civilian needs which is also now oriented to meet the defence needs.

India's Quest to Use Space as a Strategic Asset

Starting early in sixties the focus of space programme needs also to address the national security concerns. With setting up of the space cell in 2008 made a good beginning and gained useful experience. With nearly after five years of experience of managing Integrated Space Cell. It is time we take stock of the situation and evaluate and prepare our selves to take on bigger responsibility of integrated tri-service space command? Such an evaluation would depend on the kind of role we expect the space assets to play in our defence calculus in future. Presently, the space assets are used on dual use basis between civil and military. This arrangement must continue due their inherent advantage of defence through deception and diversity and redundancy. This also injects dilemma in the adversary's plan of action who obviously can not hit all assets due to fear of similar reprisals as well as criticism from the world community for targeting civilian facilities. In addition, dedicated defence space assets are needed to assist the military in performing its roles. The assets and their role itself would depend on our defence space vision.

Defence Space Vision

With the inherent advantages possible with use of space in military, the militarisation of the space is inevitable

especially as space laws don't bar militarisation of space. It would be folly therefore, to ignore the role played by the space assets in fighting the adversary who invariably would like use hard/kill measures to deny us the use of our space assets. The space vision could be visualised in supportive as well as in space control roles.

Force Supportive Role

The supportive role is essentially helps in Force enhancement by exploitation of the space assets with force multiplier effect to the fighting elements but does not provide protection to the space assets. Force enhancement is achieved by use of satellite intelligence, surveillance, and reconnaissance (ISR, missile warning, environmental monitoring and through network centric operation satellite communications; and through space-based positioning and navigation).

Space Control Role

The space control could be defensive as well as offensive. Defensive Space Control is conducted to preserve our ability to exploit the space capabilities while protecting the friendly space capabilities from attack, interference or unintentional hazards. Offensive space control capabilities on the other hand are meant to prevent an adversary's use of space and to negate adversary space capabilities using disrupt, deny, deceive, degrade or destroy strategy. However, it is not possible to achieve both forms of space control with out Space /battle field Situational Awareness.

Space Organisational Architecture

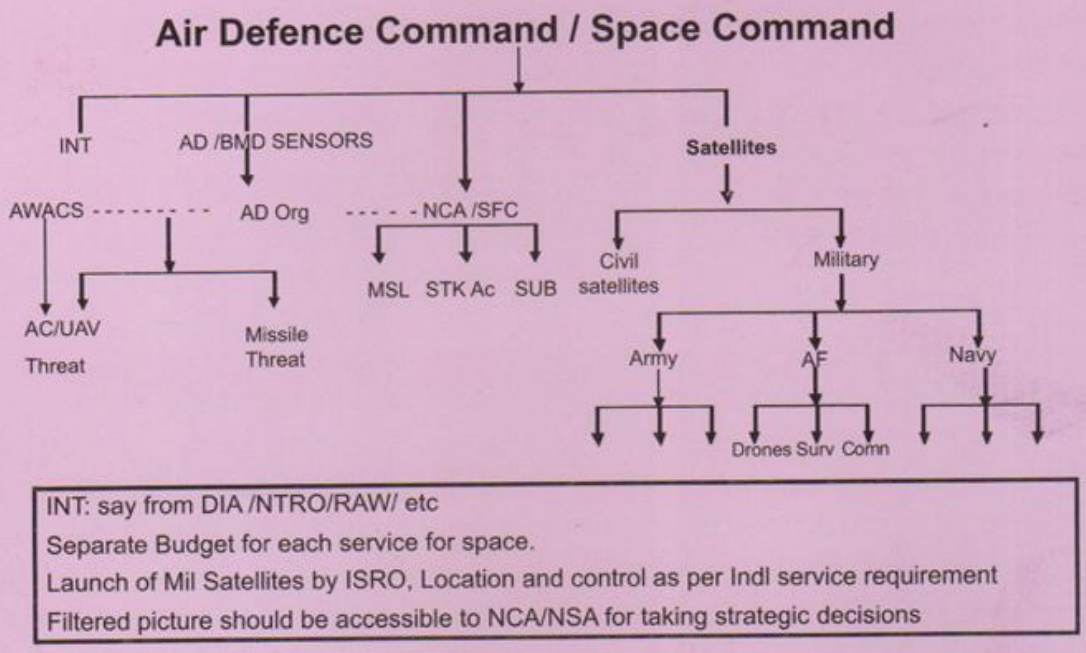
The civilian space policy is implemented by Space Commission in co-ordination with Department of Space and ISRO. The Defence Space Policy which is a natural corollary to the Defence Space vision will be implemented by HQ IDS through Aerospace Command once in place. The organisation, manning and its training requirement of the Aerospace command and individually of three services would depend on the Space Policy which invariably should match our realistic requirements as in our context the wars would be localised, short and swift with regional perspective. The space assets have a role both during peace and war. In war however, the needs will generally be more specific to the individual service and its strategic and tactical roles.

To meet the individual service objectives, level of staff and command channels and modality of flow of information at inter and intra service level needs to be established. Apart from this, the tri-service aerospace command when established, would need close linkage/networking with existing Air Defence Organisation, Ballistic Missile Defence (BMD) and the Strategic Forces Command for appropriate operational responses by the concerned agency. Such an integration would also help in timely activation of passive defences as well as active defences against air threats (aircraft and missiles) using existing air defence resources and BMD. This would also help NCA/NSA (who should be in loop) in taking decision to use strategic weapons if required. Space command would coordinate with ISRO for sharing of facilities on civil satellites as may be done even now as well as launch dedicated satellites for the services to meet their strategic and tactical mission needs. Besides, navigation and targeting assistance, the space based assets could be tasked for two main functions: communications and reconnaissance. The communication should be made available in the form of data as well as voice. The satellite based reconnaissance can provide both warning and damage assessment after the Aircraft/missile attack /nuclear detonation.

The military satellites differ from the commercial satellites in four aspects: military satellites should employ encryption, be nuclear hardened, have better resolution and have anti-jamming capabilities.

Org of Aerospace Command

A suggested schematic diagram given below gives requirement of networking and linkages between space command and other parallel organisations for effective Operations.



The future tri-service space command would require trained manpower. For instance, U.S. space command has manning of nearly 40,000 personnel (military, civilians and contractors) who perform space command functions from 88 locations spread world wide. Taking cue from this, Indian Aerospace command should have well trained civilian and service staff that are protected form tenure based moves so that talent is not frittered away and also to avoid requirement of training/ retraining of new staff. Further, the capacity needs to be built to launch mission specific satellites for each service at short notice as well as to cover the gap created in surveillance due non availability of satellite due to un-serviceability/damage caused by enemy action. There seems to be some short comings on this account or else why launch of dedicated satellites for the services is delayed.

Since the cost of launching satellites is prohibitive we may consider launching cheaper mission specific small (micro/Nano) satellites. India is yet to launch dedicated service specific satellites however; whenever feasible the dedicated service specific satellites even though launched by ISRO would require control by the individual service to cover their specific mission needs. This obviously also spells a need for a separate budget for each service.

Space laws

Several countries such as USA, Russia, Australia, Canada, UK, Sweden and Israel have enacted national space legislations to regulate and guide their space activities. India too needs space legislation for fully harmonising the domestic legal environment with the specific obligations arising from international treaties related to space, in which India is a party. The national space legislation, in particular, should address the specific interests and needs while Aerospace Command is established.

Protection of Space Assets

India is also set to deploy its indigenous Ballistic Missile Defence which according to the former DRDO Director, Dr. Sarsawat, who during his address to the media at Biannual air show at Bangalore, Aero India 2013 asserted that Indian BMD will provide a building block for an Anti Sat weapon which can be assembled at short notice if required. But, the capability in being is different than the actual which alone can deter the inimical power to target our space assets. The draft Code of Conduct (CoC) for Space Activities is under discussion under the aegis of United Nation. Willy-nilly the space activities will get regulated with a possible ban to develop such weapon but, this will not destroy or dismantle the existing capability which United States, China and Russia has already exhibited by their tests. In fact, both Beijing and

Moscow are actively canvassing for the space arms control treaty, the PPWT (Treaty on the Prevention of the Placement of Weapons in Outer Space, the Threat or Use of Force against Outer Space Objects) which is for the time being does not have U.S. support may get its support at some stage. If International community decides (whether formally or informally) to ban Asat tests, we may face predicament similar to NPT. Hence, we need to take a decision in the national interest in earlier time frame to show case our capability and deter our potential adversaries from targeting our satellites. Being a responsible member of the world community unlike Chinese ASat, test, we may carry out test at lower height to avoid generation of space debris.

Some Questions

We need to carry out a holistic exploratory audit to assess our preparedness to face challenges of the space when militarization of the outer space seems a fait accompli:-

(a) The traditional military use of outer space has spread from supportive roles such as communication, navigation, reconnaissance, surveillance and early warning at peacetime, to direct war fighting roles such as command and control, target positioning and guidance of delivery means. Do we have indigenous ability to assist the armed forces to perform these roles?

(b) Are Armed forces prepared to take on these tasks organisationally and functionally?

(C) Has each service worked out the modality and level of staff and command channels for dissemination and flow of Network Centric Information?

(d) Equipment and manpower requirement, and their technical and training needs to take on the complex tasks.

(e) Are our satellite launches and control infrastructure sufficient for our future needs?

(f) What should be the modality of information sharing inter and intra services?

(g) Anti- satellite tests of America, Russia and China are reminders of the threat to the space assets. How are we to ensure that we continue to conduct unhindered operations despite such challenges?

(h) Does ISRO have capability to build and launch need based satellites at short notice to overcome limitations caused by un-serviceability/ damage of the equipment?

(j) Excessive dependence on its complex and exposed network of sophisticated command, control, communications and computer-based intelligence, surveillance and reconnaissance systems operating synergistically through space can become also become an Achilles heel. How would we overcome this challenge?

(K) Cyber threat to our space assets.

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