Anti-Access/AreaDenial Strategy for Pakistan Navy: A Work in Progress

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Abstract

Pakistan Navy (PN) has embarked on the largest modernization program in its history. The modernization is not only aimed at plugging the gaps in its operational capabilities but also making it a potent force. It is being equipped with a range of anti-ship missiles to keep the Indian ships at bay and inducting effective air-defense systems that will deny the Indian Navy freedom of action in its area of control. The induction of new types of ships from China and Turkey is helping it realize these objectives. The induction of new ships will not only increase the numerical strength of PN but also bring with them new technologies and new roles. PN`s modernization plan is in line with what is termed as the Anti-Access/Area-Denial (A2/AD) strategy. This paper discusses the induction of new assets and attempts to figure out their capabilities under the strategy of A2/AD operations, with the limited available primary source data. It also identifies the areas where further work is needed.

Keywords

Power Projection, Sea Control, Air Defense, Cruise Missiles, Anti-Ship Ballistic Missile, Anti-Access, Area-Denial.

Introduction

Pakistan Navy is a smaller force as compared to its rival Indian Navy (IN) which is more advanced and therefore has a wider scope for operations. PN on the contrary is structured as a defensive force with the assigned task of protecting the maritime interests of the country and deter aggression at and from the sea.[1] Pakistan Navy

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has historically operated small number of ships, submarines, and other naval assets vis-a-vis a larger Indian Navy. Indian Navy boasts of more resources and assets with ambitious objectives of controlling the Indian Ocean and enjoying a worldwide reach. During 1971 war Indian Navy had successfully hindered the movement and operations of the Pakistan Navy. Indian Navy had also caused severe damage to the oil reserves in Karachi and succeeded in curtailing the operations of the Karachi Port. Therefore, to defend its coastal areas, sea lines of communications and trade, Pakistan Navy's plans aimed at restricting the ability of the IN to operate close to Pakistan`s coastline and keep her away from important trade routes. Pakistan Navy strategizes to deny the Indian Navy access to near waters and limit its freedom to carry out offensive operations. The plan is actualize by operationlizing anti-access/area-denial (A2/AD) strategy. Under this strategy, the aggressor is denied the freedom to project power and limits its operations to a certain area. In Pakistan's case, A2/AD can be a potent strategy in mitigating the threat of the growing reach of the Indian navy in the Indian Ocean and the Arabian Sea.

A2/AD Strategy and its Elements

The A2/AD is a relatively new term for an old style of warfare.[2] Even though the term is associated with the Russian and Chinese military strategies but they do not officially use the term. The DOD Dictionary of Military and Associated Terms defines the anti-access as the "action, activity, or capability, usually long-range, designed to prevent an advancing enemy force from entering an operational area" and area-denial as an "action, activity, or capability, usually short-range, designed to limit an enemy force's freedom of action within an operational area."[3] In simple words, A2/AD is meant to create a no-go area for the enemy. The anti-access element of this strategy is designed to restrict access of the enemy into a particular area, and its area-denial element denies the enemy freedom of

action by taking defensive measures, if the access has been gained. Geographically, A2/AD increases the distance and time for the deployment of forces by kinetically degrading the capabilities of the offender to enter and operate into an A2/AD zone.[4] These capabilities are designed to deter, deny, delay and disrupt the deployment and operation of opposing forces. It increases the costs, risks, and challenges for the opponent to enter and operate in an A2/AD zone. Even if the A2/AD is not successful in limiting the access of an opposer or causing it to operate from a distance, it slows down its deployment and forces it not to operate from certain areas in the A2/AD zone.[5]

The A2/AD strategy is essentially a defensive strategy aiming at keeping the aggressors away from one's zones of defense. However, the weapons systems such as cruise and ballistic missiles employed in this strategy can also be used as offensive weapons and aid in the offensive operations by creating a secure bubble around the offensive forces in a foreign theater.

The anti-access element of A2/AD includes offensive weapons such as attack drones, ballistic and cruise missiles, and cyber weapons. These weapons can be deployed on the coast as well as on warships, submarines, and fast attack crafts. This element creates a safe area where the enemy ships and aircraft will prefer not to enter to avoid being hit. Ship-based anti-ship missiles stand out against the land-based systems in terms of ranges. The area denial element depends on the use of air and sea defense systems. The use of surface to air missiles (SAMs) enhance the chances of defense as compared to the point defense systems. The use of SAMs provides area defense, as compared to point defense systems, covering a single asset. The use of anti-satellite and cyber weapons blinds the communication networks on which the deployment of militaries depends.

For A2/AD to work effectively also requires intelligence, surveillance, and reconnaissance capabilities. Furthermore, cruise missile technology has made it easier and cheaper for countries to conduct A2/AD operations as the accuracy, ranges, and speed of anti-ship cruise missiles have increased in recent years. Anti-ship ballistic missiles are also becoming potent weapons for operationalizing the A2/AD strategy. The ability for tracking and surveillance of enemy's movement in real-time has also benefited from developments in space technologies. Similarly, the navigation and guidance systems have improved considerably in precise targeting.

Several countries that face the threat of invasion and are inferior to the aggressor's military forces have adopted this strategy. China has claim over South China Sea and the East China Sea and doesn't want the US and other rivals to have a large naval presence in these seas. China's A2/AD strategy is designed to deny the adversaries freedom of movement and operation in the South and East China seas. In order to achieve this objective, it has moved the battlespace away from the Chinese mainland. China's A2/AD relies on a range of anti-ship cruise missiles, the DF-21A "carrier killer" ballistic missile, a fleet of diesel-electric submarines, surface fleet of frigates, destroyers, missile boats, land-based ballistic and cruise missiles, and air defense systems. In addition, the Peoples Liberation Army Navy (PLAN) also operates strike and air superiority aircraft carrying anti-ship missiles. These systems have different implications and accrue several advantages for the PLAN. PLAN deploys a variety of weapons on its surface fleets such as anti-ship cruise missiles while the Second Artillery Corps controls the land-based anti-ship ballistic and cruise missiles. In the Chinese military the A2/AD concept is known as Active Defense Strategy as mentioned in the National Military Strategic Guidelines in 1993.

Similarly, Russia has also developed various systems to create secure zones around its international borders in Eastern Europe. It faces a threat from NATO's encroachment in Eastern Europe as several former Soviet Union states have joined this military alliance. The US and NATO allies also enjoy naval supremacy over Russia. Russia therefore not only faces threat from the land-based forces in Eastern Europe but also from their respective naval presence, especially in the Black Sea.[6] Russia's S-300 and the S-400 systems are developed to offset the advantages of the US and its NATO allies' offensive capabilities. These systems provide Russia with defense from air and sea-based threats. These air-defense systems have also become the flagship export items of the Russian defense industry.

The A2/AD strategy as briefly discussed above is adopted by those countries which face technologically superior and ambitious militaries. Russia and China are facing conventionally superior forces in Eastern Europe and South and East China Seas respectively. Pakistan's situation is not significantly different from these two countries. It faces a superior Indian Navy whose power, ambitions and goals in the Indian Ocean are growing aiming at becoming the controlling force in the ocean. The growth in power and ambitions of the Indian Navy pose a direct threat to the security of Pakistan and its maritime interests. The A2/AD, therefore, suits Pakistan's objectives of limiting India's power projection in its area of influence and safeguarding its own interests.

Strategic objectives of Pakistan Navy

The stated objectives of Pakistan Navy are "to protect maritime interests of Pakistan, deter aggression at, and from the sea, provide disaster relief, participate in the development of coastal communities and contribute to international efforts in maintaining

good order at sea."[7] Traditionally Pakistan Navy has been a smaller force as compared to the Indian Navy. Growth in the imbalance of Pakistan's fleet vis-à-vis the Indian Navy has become more obvious in recent years with new inductions by the Indian Navy. This has also been due to the nature of the objectives of both forces. Pakistan Navy is designated to defend its area of influence and maritime interests. It is also smaller in size compared to the other two arms of the Pakistan military.

Pakistan has a geostrategically important location in the Arabian Sea, through which important trade routes pass. It has a 1000km long coastline and an exclusive economic zone of 240,000 sq. km. It has also won exclusive rights over an additional continental shelf area of 50,000 sq.km.[8] Pakistan's trade mostly depends on the sea as more than 95% of its trade is conducted by sea. The development of the blue economy by utilizing the full potential of Exclusive Economic Zone of Pakistan can contribute significantly to Pakistan's economy and its sustainable growth in the future. Important sea lines of communications for Pakistan are in Persian Gulf, Red Sea, and the Far East. Security of its exclusive economic zone and sea lines of communications is crucial for the Pakistani economy during peacetime and war.

The Indian Ocean presents both the traditional and non-traditional threats to the maritime interests of Pakistan. The development of China Pakistan Economic Corridor (CPEC) and the development of Gwadar Port have increased the responsibilities of the Pakistan Navy for enhanced maritime security. In addition, the detection of an Indian Navy submarine in the Arabian Sea after the Pulwama Crisis in 2019 also further enhance Pakistan's threat perception from the sea. Few years earlier an Indian Navy submarine was also detected and compelled to move away from Pakistani waters on 14 November 2016.

The maritime environment in the Indian Ocean region is changing. The US-Iran conflict in the Persian Gulf has the potential to intensify and the conflict in Yemen is also impacting the regional security environment.[9] These conflicts can pose a threat to the Sea Lines of Communications of Pakistan. Furthermore, non-traditional threats like piracy, drug trafficking, and maritime terrorism remain persistent. The evolving challenges in the Indian Ocean Region call for a greater role for Pakistan Navy.

India's Ambitions in the IOR: A threat to Pakistan

India's naval build-up and the increasing manifestation of its great power ambitions with a large naval force are naturally a threat to a defensive and smaller naval force of Pakistan. India has a large fleet of ships, submarines, and also operates an aircraft carrier. There is a huge imbalance of fleets between naval forces of both countries. The imbalance is also seen in the ambitions and strategic objectives. Indian Navy's objectives and plans are more ambitious and hegemonic. India follows a strategy to control the entire sea and deny its use to others. It also wants to control the choke points in the ocean in partnership with its key allies. Some scholars see India's role "as a protector of the international order set up by the United States in the region."[10]

Indian Navy operates capital-intensive ships, aircraft, surface ships, submarines, helicopters, and amphibious capabilities to operationlize its sea control and denial policy. In the heavy tonnage capacity the Indian Navy's surface fleet consists of thirteen destroyers and thirteen frigates of different classes and tonnage. These are armed with anti-ship, land-attack, and air defense capabilities of various types. It also operates a large number of patrol and coastal combatant ships. Indian Navy is planning to further increase its strength. It aims to operate a fleet of over 200 surface vessels by 2027 compared to the current 137 ships and

plans to increase the number of attack submarines from the present 15 to 24 and the number of aircraft to 500 from the present 220.[11] Besides operating one, INS Vikramaditya aircraft carrier, it is in the process of commissioning the INS Vikrant as the second aircraft carrier. There are also plans for the acquisition of a third aircraft carrier. Traditionally Russia has been a supplier to the Indian Navy and Russian technology has remained a prominent feature of the Indian Navy's ships and submarines. Now the QUAD members, Japan, Australia, and the US are also developing into strategic partners of the Indian Navy. They are helping the Indian Navy buildup by sharing modern technologies. India has gained easy access to Western markets as well due to geopolitical reasons and comparatively large defense budget allocations. Its cooperation with France, Japan, Australia, and the US is manifesting under various initiatives such as Quad, Malabar naval exercise,[12] Paris-New Delhi-Canberra axis, and Rim of the Pacific Exercise (RIMPAC).[13]

The growing Indian naval partnership with its western allies is justified by blaming China of making strides in the Indian Ocean by both India and Western countries. Western powers already operate in the region and want to limit the Chinese access and presence here. But China's primary focus remains the South and East China Seas and the Western Pacific Ocean where China wants to curtail the US presence. China does not presently have a significant presence in the Indian Ocean. However, it is being used as a pretext by India to justify its naval expansion and moves to control the ocean. The rivalry between Pakistan and India continue to define their bilateral relationship, Indian ambitions and a naval buildup in the Indian Ocean Region therefore pose a direct threat to the maritime interest of Pakistan. Indian naval buildup poses risk of instability in the region and contributes to an arms race between the key players.[14] Along with the challenges discussed above, the

growing strength of the Indian Navy is the primary threat that calls for an enhanced role and capabilities of the Pakistan Navy.

A2/AD for Pakistan Navy

A2/AD as a term may be new to some but the strategy is not a novel one. Pakistan Navy has neither announced the adoption of the A2/AD strategy nor acknowledged it officially. The paper discusses and tries to figure out the nature and direction of the modernization trajectory of the Pakistan Navy, which appears in accord with the A2/AD strategy. In the Maritime Doctrine of Pakistan (MDP) there is no mention of A2/AD operations[15] and Pakistan Navy has always focused on the defensive strategy. In recent years, with the addition of new equipment, its strategy is changing from simple defense to an active defense where a naval force is able to take an initiative and cause losses to the adversary. The A2/AD strategy as a term covers the actions required of securing maritime interests of the country. A2/AD capabilities meet Pakistan's objective of denying India operational access to maritime frontiers of the country and securing important assets along the coast and on the sea. The deployment of anti-ship missiles will create a buffer zone by increasing the time and distance for the Indian Navy to strike targets in Pakistan and deployment of defense systems will provide area defense by denying the adversary the freedom of action. It creates a no-go area for Indian Navy ships near the Pakistan Navy's assets. If the adversarial forces have entered into an area of operations the AD capabilities will deny them achieve favorable results by blocking their efforts. Friendly forces can then impose high costs on the enemy by launching offensive strikes against them when the enemy force is denied space to manouvre or act.

The increase in the endurance and strike range of Pakistan Navy's warships and missiles will move the area of operations further into

the sea thereby increasing the defensibility of the coast. A2/AD capabilities also make the risk calculation and decision-making of the adversary complicated and long. The other objective of the A2/AD is to protect the trade routes and sea line of communication of Pakistan in the Indian Ocean and the Arabian Sea. Enhanced firepower and defense systems deployed on frigates and corvettes would strengthen navy's ability to tackle the threat of blockade of trade routes. Deployment of medium-range defense systems on frigates will protect surface ships from aerial threats such as cruise missiles.

Pakistan Navy's Modernization in Context of A2/AD Strategy

Pakistan Navy`s strategy is changing from a defensive to an offensive-defense strategy which will enhance its capability and credibility. Its aim is not to compete with the Indian Navy but to maintain a credible deterrent force. Pakistan Navy's modernization plan is in line with the basic strategic principle of defense amidst the increasing threat perception from the Indian Navy. Under the modernization plan, Pakistan Navy wants to add another 50 ships including 20 major ships. The acquisition of these ships will help Pakistan Navy to carry out regional and international maritime obligations. Currently, Pakistan mainly operates frigates, corvettes, and fast attack crafts, and a fleet of attack submarines.

Anti-access Elements of Navy's Modernisation

The anti-access elements of the Pakistan Navy comprise of a series of warships, submarines, and anti-ship cruise missiles. It is presently in the process of acquiring four Type 054 Frigates,[16] four Ada class corvettes under the project MILGEM,[17] and two more Damen corvettes.[18] The Jinnah class frigate is still in the design phase. The number of Jinnah-class ships would also be reportedly four. Navy is also interested in buying six heavier tonnage ships.

These ships will be 5000+ in tonnage according to available reports. Heavier tonnage gives more endurance, firepower, and room for the surface to air missiles. Ada class corvettes and Jinnah class frigates are part of Turkey's MILGEM project. This project also includes a heavier tonnage TF-2000 frigate. The heavier frigate, therefore, can be based on TF-2000 or built with China's cooperation.

Eight Type 039A attack submarines are under construction in China. They will form the Hangor class in Pakistan Navy.[19] These submarines have a displacement of 2800 tons, 76-meter in length and 10-knot speed. They can carry heavy torpedos, anti-ship cruise missiles, and Babur III submarine-launched cruise missiles (SLCM).[20] Hangor class submarines have 6 × 533 mm torpedo tubes to fire torpedoes or anti-ship missiles more than the 4 × 533 mm tubes on the Agosta 90B submarines. Pakistan currently operates three Agosta 90B and 2 Agosta 70 class submarines.[21] Induction of these eight submarines will increase the total number of submarines in the Pakistan Navy's inventory to thirteen by 2028.

With the induction of new ships not only the number of ships will increase but also new electronics, sensors, and air defense systems will be introduced in Pakistan Navy. A reasonable number and displacement of surface ships are necessary to carry anti-ship and land-attack cruise missiles. Anti-ship missiles when deployed on ships can strike at a farther distance as compared to the deployment on the coast. Smaller missile craft carrying those missiles also free up the burden of frigates. However, missile crafts and boats have range and payload limitations. The Type 054A Frigates are going to be the technologically advanced and valuable addition to the PN when inducted. They will enhance the anti-ship, anti-submarine, and anti-air warfare capabilities of the Navy. Type 054A ships have a 1 × 32-cell Vertical Launch System to launch surface to air missiles. The HQ-16 SAM medium-range air defense

system is most likely to be fitted on it. In the anti-ship domain, it has the capability of 2 × 4 C-803 anti-ship / land-attack cruise missiles and in anti-submarine warfare, it can launch 2 × 3 324mm Yu-7 ASW torpedo and 2 × 6 Type 87 240mm anti-submarine rockets. These capabilities of Type 054A frigates fulfill the requirements of A2/AD operation in all the domains.

The other major induction of Pakistan Navy will be the MILGEM class corvettes. Pakistan signed a deal for four of these ships in 2018 with Turkey's Military Factory and Shipyard Corporation. Karachi Shipyard & Engineering Works (KSEW) and Istanbul Naval Shipyard (INSY) will each build two ships. The ships will be equipped with surface, sub-surface, and anti-air warfighting capabilities.[22] While the Type 054A frigates are entirely Chinese technology MILGEM corvettes are entirely western and Turkish technology. The corvettes are likely to carry Albatros NG Naval Based Air Defence (NBAD) system developed by MBDA UK.[23]

Anti-ship missiles are an important part of anti-access capabilities. Pakistan Navy can deploy a variety of anti-ship cruise missiles like Harbah, Zarb, Exocet, C-802AK, C-803, and Harpoon block-2. Ada class corvettes may also bring ATMACA anti-ship cruise missiles with them. Harbah was tested in January 2018 from Azmat Block II-class fast-attack craft and is said to be better than the older Harpoon and C-802 missiles.[24] Babur 1B and Babur 2 are dual-mode anti-ship and land-attack cruise missiles. They have the capability to engage targets at sea with high accuracy.[25] Zarb is a land-based anti-ship missile and can guard littoral waters and the coast of Pakistan. It is fired from moving vehicles and can carry a heavier payload than those deployed on ships.[26] The C-802AK is deployed on JF-17 aircraft and C-802 on the F-22P frigate.[27] In addition to subsonic missiles Pakistan Navy is developing a supersonic cruise missile. Whether it is a land attack or anti-ship

missile is not known as the details about the missiles are not yet made public.

In addition to cruise missiles Pakistan also operates the CM-400AKG quasi-ballistic-anti-ship missile from its JF-17 No.2 Squadron at Masroor Air Base in Karachi. The missile is powered by a rocket motor with a range of up to 250km and a top speed of Mach 4+. The advantage of CM400AKG is that it gives a higher speed, is more affordable than cruise missiles, and its trajectory can be useful in avoiding the air defense system.[28]

The plan to develop a truly anti-ship ballistic missile was announced by the ex-Chief of Naval Staff of Pakistan Navy, Admiral Zafar Mahmood Abbasi during his farewell address who said that P282 ship-launched anti-ship ballistic missile[29] is being developed by Pakistan Navy. Anti-ship ballistic missiles have attracted a lot of attention after the development of DF-21 by China. The advantage of these missiles is the increased range and speed at which they can strike enemy ships, especially the aircraft carriers. If P282 is a ship-launched anti-ship/land attack ballistic missile, it is more likely to have been designed for use against Indian Navy aircraft carrier and other large ships. The Indian aircraft carrier is inferior in technology and poses no major threat to China. Its main use will be against Pakistan. An anti-ship ballistic missile with sufficient range will help Pakistan neutralize the threat of Indian aircraft carriers. After induction of this system in PN, Indian Navy will be hesitant to bring the aircraft carrier close to within the striking range of Pakistan's weapons. If the P282 is developed as a dual-mode ship-launched land attack and anti-ship missile, it will serve the purpose better. This will add the ballistic missile capability to Pakistan Navy against land targets from the sea. PN can destroy important land-based enabling assets of IN to weaken it. The development of P282 will play a key role in limiting the reach of the IN surface ships. However, a nuclear-capable ballistic missile deployed on a

submarine is a different matter. The purpose of which is to enhance the second-strike capability of nuclear deterrence. The technology can also be shared across different domains.

Pakistan Navy has also inducted LUNA NG reconnaissance, surveillanceand target acquisition (RSTA) unmanned aerial vehicles (UAVs) into its air arm fleet with plans to induct unmanned combat aerial vehicles in future to increase its ISR capabilities and support maritime operations.[30]

Pakistan Navy will have 14 Long Range Maritime patrol aircraft (LRMPA) after the induction of 10 Sea Sultans. Sea Sultans are going to replace the P-3Cs. Sea Sultan is based on Embraer Lineage 1000 jetliner commercial aircraft. These will be ordered, and delivered in different phases.[31] LRMPAs are critical for not only searching the targets but also targeting them. They can perform the ISR operations along with carrying out anti-surface and anti-submarine warfare besides providing airborne early warnings (AEW).

Area-denial Elements of Navy's Modernisation

The area-denial element of A2/AD is not going for a major transformation as compared to the anti-access element. Currently PN operates short-range FM-90N SAM deployed on an F-22P frigate and LY-60N SAM on two Tariq class frigates. Type 054A will come with medium-range LY-80 SAMs. It has a range of 40km and the upgraded version has reportedly a 70km range. A long-range air defense system may come on the six future heavier tonnage ships. A coast-based air defense system can be another option.

Looking at the already underway and planned modernization of the Pakistan Navy, China appears to be its primary and major supplier of weapons systems. Traditionally Pakistan has operated Western platforms and systems like the Agosta AIP submarines from France, Type 21 frigates from the UK and other systems from the US. Due

to geopolitical and economic reasons Chinese platforms and systems are replacing Western systems. The weapon systems Pakistan is buying are also deployed by China under its Active Defense Strategy to restrict and limit the movement of foreign elements in its area of influence. The nature and purpose of these weapons fit well with the objectives of the Pakistan Navy in the Indian Ocean too. Other than China, Pakistan's cooperation with Turkey with respect to its naval modernization is also moving ahead.

Indigenous research and development are important for self-reliance and technological development of any country. It was an area on which much attention was not paid in the past by Pakistan. For indigenous research and development Pakistan Navy has now established the Naval Research and Development Institute (NRDI) in Karachi. Pakistan Navy is currently engaged in the development of multiple weapons systems. These include frigates, submarines, supersonic cruise missiles, ship-launched ballistic missiles, directed energy weapons, UAV jammers, underwater sonar surveillance, coastal defense systems, unmanned underwater vehicles, and unmanned combat aerial vehicles.

Raising the Nuclear Threshold

The development of conventional capabilities also raises the nuclear threshold between the two countries.[32] Strong conventional forces enhance the credibility of the deterrent. With the enhanced conventional capability of Pakistan Navy, the situation will not be one-sided in the Indian Navy's favor in a war of attrition and Pakistan Navy will therefore be in a better position in a future encounter with its adversary. Pakistan is developing nuclear-capable cruise missiles to form its second-strike capability as a deterrent against the Indian development of sea leg of its nuclear forces. Pakistan's nuclear-capable Babur III cruise missile

with a range of 450km, is likely to be deployed on its Agosta 90B submarines or on the Hangor class submarines in future. Induction of new submarines will make enough undersea platforms available for the nuclear deterrent role as well as surveillance and intelligence, precision strike and sea denial operations.

Way Forward

With these ongoing and planned modernization PN will not be totally on the disadvantageous side in a future war with the India. Not only the rate of attrition will diminish but also the credibility of the Navy's conventional assets will increase. However there are several areas where more work is needed given the expansion of the Indian Navy. ASCMs which the Pakistan Navy deploys are subsonic, whereas India has a supersonic land-attack cruise missile and has tested it in an anti-ship role as well. Furthermore, it is also developing and testing hypersonic technology. Hypersonic technology can also be used in the anti-ship role once developed and matured. Pakistan's announcement of the development of its own supersonic cruise missile is a positive development. However, the work should be accelerated on it. Pakistan Navy has no plans to build hypersonic cruise missile capability at the moment, which can start after the development of supersonic capability. There will also be a need for a long-range air-defense system to complete layers of tactical, short, medium and long-range defense systems. The defense of surface ships and submarines from the Indian Navy firepower is also a matter of priority. Indian ASW capabilities with the help of the US are also growing. To counter that, the increase in submarine defense and ASW capabilities of the Pakistan Navy is equally important. A2/AD operations are also tied with the enhancing of reconnaissance and surveillance capabilities. The increase in the network-enabled operations calls for an uninterrupted and undisturbed reliance on them. The security and protection of the electronic and cyber systems against electronic

and cyber-attacks have become a higher priority. Space-based assets such as electro-optical sensors, synthetic aperture radars, and electronic intelligence technology are enablers of the A2/AD operations. Self-reliance on these technologies makes A2/AD operations smoother and more effective. Satellites would also support the precise targeting for the anti-ship ballistic and cruise missiles by providing real-time information. Air-defense systems, ASW and ISR capabilities, and increase tonnage and number of ships are important areas.

Conclusion

Pakistan Navy has traditionally been a defensive force and it is going to remain one in the foreseeable future. Its strategy has been to defend the country's coastal assets and trade routes by keeping the Indian Navy at bay. But the Indian Navy was successful in breaching the Pakistan Navy`s defenses during the 1971 war. The development of A2/AD capabilities would prepare the navy to do this role more efficiently by limiting and slowing down the offensive forces and denying them a free hand. The objective is the same, however, an active defense strategy will increase the security of Pakistani territory and waters. With the operationalization of A2/AD capabilities Pakistan Navy will be in a better position to protect its sea lines of communication and trade routes which the Indian navy will try to blockade in a future war. The development of A2/AD capabilities is an ongoing work, and a lot is still to be done. Once these capabilities are fully acquired, Pakistan Navy will be a force to reckon with.

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