

Operation Neptune Spear and Role of Technology

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The US Special Forces undertook Operation Neptune Spear nicknamed "Geronimo" to kill Osama bin Laden on May 02, 2011. The importance of this operation is momentous. In the absence of any detailed disclosure by the US administration (till date) about the conduct of this operation, except the press conference held by intelligence officials immediately after the operation, it becomes difficult to study this operation in depth. On the other hand both multiple narratives of this operation are available in electronic and print media. This information is probably based on secondary and tertiary sources and perhaps the intentional leakages of the US administration. Some of these narratives could also be brushed aside as conjecture. However, for various security establishments across the world it is important to at least acquire some understanding about this operation. This could help them to draw several lessons of military importance. It would also help to understand the level of the current level of preparedness of the US forces.

Introduction

In the absence of authentic information regarding Operation *Neptune Spear*, there is a need to construct a narrative by logically analysing the available information, filtering the noise, and trying to pick up the right information/sources. It is also important to analyse the available information in the backdrop of the hardware and software at the disposal of the US forces in the Afghanistan-Pakistan theatre and the capabilities of the US Special Forces to undertake such an operation.

This operation can be said to have succeeded for multiple reasons: The full support of the US government; the clarity of the aim (to kill Osama bin Laden) and the perfect execution of the mission by the US Special Forces; the role played by various other military agencies and intelligence agencies in the background and the perfect selection and usage of vital military software and hardware and necessary technologies. This essay attempts to put in perspective the various military equipments and range of technologies used to make this operation successful. Due to the limited authentic information this essay attempts to join various dots with the aim of creating a coherent narrative.

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From the technology perspective it is important to study this operation at various levels. It is important to recognise the specific role played by the aerial platforms and weapon systems used in the conduct of this operation. The operation was based on very authentic intelligence inputs. The process of intelligence gathering probably lasted for many months/years. It is important to study the surveillance and reconnaissance undertaken for this purpose. Also, it is important to understand the nature of communication and jamming technologies possibly used for the conduct of this operation. It is also important to identify the nature of technologies used to genetically confirm that the individual killed was indeed Osama bin Laden. In all probability, stealth technology was the main technology used during this operation.

Stealth technology or a low observable technology (LO technology) is a significant military technology mainly used in the manufacture of combat aircraft. This also has applications in ship, submarine and missile industry. Its basic purpose is to use certain materials on the surface of the aircraft or missiles or submarines to conceal the identity of the system and make it invisible to radar. This could be achieved by painting the system with camouflage paint that can absorb radar signals. Such materials are known as radar absorbent materials (RAM). Another way to achieve invisibility is by building the platform of a shape that deflects any signals away from the radar equipment. Also, certain systems are so designed as to conceal the engines of the platform say in the body of the airplane.

Technology Was the Key

The following paragraphs create a likely scenario by identifying the military equipment, techniques and technologies which could have been used in the preparatory and conduct phase of *Op Neptune Spear*. This assessment is based on information extracted from various websites and other newspaper reports. An attempt has been made to decipher this information rationally, connect the dots and state the (possible) obvious. The operational phase of *Op Neptune Spear* lasted for approximately 40 minutes. This attack phase was supported by a lengthy preparatory phase. Since 9/11, the US had been trying to capture/kill Osama bin Laden but success came very late. Various intelligence gathering mechanisms were put in use for this purpose particularly, after 9/11. Hence, it would be difficult to state the exact period of the preparatory phase for this particular operation. It must have taken a huge investment in resources over a very long period of time as well as meticulous planning before this operation was launched. It involved the systemic gathering and interpretation of huge volumes of human and technological intelligence inputs. The entire operation was executed almost flawlessly by the maritime special operations group of the US Navy. This group is the Naval Special Warfare Development Group (NSWDG), referred to as DEVGRU. The group is more popularly known by its former name SEAL (sea, air and land teams) Team Six (ST6)¹.

The target in Pakistan, identified for this team, was a three-story house in the township of Abbottabad famous for its salubrious climate and also because the Pakistan Military Academy is located there. This house was encircled by 12-foot-high concrete walls. Other physical security measures in place for this hideout for Osama were the layers of barbed wired fencing on the periphery and an additional security wall inside the compound.

The US forces were not able to capture or kill Osama for almost a decade. Was their overdependence on technologies for gathering intelligence one reason for this? And, technology alone could not be blamed for Osama going free for all these years. Probably, the problem was a lack of human intelligence. Perhaps, it was the use of technology in isolation that failed to deliver the required results. When the technical intelligence was combined with human intelligence success followed.

Interestingly, it was not technology per se but, actually the absence of technology which is believed to have given a real lead for this operation. For many years Osama managed to evade identification of his whereabouts by minimal or zero usage of technology. He had stopped using satellite phones for communication after the 1998 missile attack on his hideout in Afghanistan in which he had escaped narrowly. Subsequently, he went totally low-tech to avoid any detection and there were stories about how he used pigeons to send messages as an alternative to the satellite phones or emails. In Pakistan, Osama was staying in a big house but had no telephone or Internet lines. This made the CIA suspicious. They followed up this clue further and carried out a reality check.

In a broad sense three to four major areas of technology could be identified as effective instruments and as force multipliers for making this operation successful. Aerial platforms, space technologies, jamming technologies and bio technology could have been the key branches of technologies with direct or indirect utility to complete this operation.

It is important to appreciate that for the US administration the collection of intelligence in a post-9/11 world remains a major challenge. During the Cold War the US intelligence setup had done a reasonably good job in monitoring various Soviet Union's activities. However, the asymmetric challenges of Osama era raised questions about the effectiveness of the traditional intelligence paradigm². Hence, in post 9/11 era, the US was not able depend fully on traditional intelligence mechanisms. They were required to develop and deploy newer weapons and technologies based on a mix of traditional and newly developed mechanisms for intelligence gathering, law enforcement and (asymmetric) offensive operations. Such technologies include a wide range of technologies from perimeter fencing security mechanisms to non-lethal weapons to robotic technologies. The US administration also had to change its methods for intelligence gathering and

is currently involved in developing new sensor technologies and also suitable software for modern day intelligence gathering.

Aerospace Technologies

The tactical phase of the operation started with transporting the commando team towards the target. The helicopters put in use for this purpose have been identified by experts as a highly modified version of the H-60 Blackhawk helicopters. Analysts have reached this conclusion on the basis of the photographs of the tail section of the destroyed aircraft which was intentionally put on fire by the US forces after it became unserviceable during the operation. It has also been inferred that this modified version of Blackhawk has stealth capabilities. Probably, these Blackhawk helicopters were two in number and were accompanied by two modified stealth Chinooks. As per some reports these modified helicopters had a cover to silence their rotors. Also, their rotors were heavily modified to avoid detection by radars.

Use of helicopters for this operation was the visible air effort. But, many other aircraft possibly could have been involved in making this operation successful. Based on the likely requirements to undertake an operation of such magnitude and the technological expertise available at the disposal of the US forces in the Afghanistan/Pakistan theatre it can be inferred that aircraft with signal intelligence (SIGINT) and electronic intelligence (ELINT) gathering capabilities must have been put into use. Aerial platforms capable of undertaking electronic warfare (EW) and jamming capabilities played a definite role in this operation. A few other aircraft also should have played a crucial role in reconnaissance operations and for the purposes of providing early warnings. Also, combat aircrafts would have remained in readiness to address eventualities, if any.

On the whole transport aircraft, fighter aircraft, reconnaissance platforms and drones would have provided the required support to the entire operation.

Some of the unanswered questions of this operation: how did the helicopters elude the Pakistani air defence network? How, were the US forces able to deceive the radars³? Were the US forces aware of the transponder codes or did they manipulate them? The stealth capability of any helicopter cannot be 100 per cent so, what additional mechanisms were used by the US forces to overcome this limitation? Another possibility is that the US forces could have used the terrain to their advantage and undertaken Nap-of-the-earth (NOE/very low-altitude) flying, thus avoiding radar identification.

Probably, the US forces had used EW platforms like EA-6B Prowlers or EA-18G Growlers currently available in the North Arabian Sea with the allied forces to support operations in Afghanistan. The aerial platforms like EA-18G Growler are carrier-based electronic warfare aircraft meant for the naval Airborne Electronic Attack (AEA) missions. They have advanced AEA avionics capable of undertaking tasks like suppression of enemy air defences (SEAD). As this system is also effective for standoff jamming it could have been used for jamming networks without entering Pakistani airspace. Aircrafts like the RC-135 could have their role fixed in regards to reconnaissance aircraft with near real-time on-scene collection. It is also capable of undertaking detection, identification and geo location of signals throughout the EM spectrum.

There are also unconfirmed reports that the RQ-170 Sentinel UAV was deployed by the US during actual operations over Abbottabad⁴. It is a UAV fitted with a full motion video capability. Not much information is available about this UAV but it is presumed that this is a stealth machine capable of flying up to 50,000 feet and can be used for SATCOM and EW missions. The US forces were aware that they were launching an attack on a target in a sovereign state. Naturally, they must have planned for any retaliation. For this purpose they had combat-proven strike fighters like F/A-18E/F Super Hornet at their disposal. These aircraft are capable of carrying various smart weapons like laser-guided bombs etc and a full spectrum mix of air-to-air and air-to-ground ordnance.

It is also expected that the US forces would have had a plan 'B' (even 'C') in place to engage such a high value target. Naturally, a significant amount of air power must have been kept ready to address any failures or last minute change of plans.

For the entire air effort used for this operation including the four helicopters involved in actual combat, it would have been necessary to have in place airspace management, a system for the management of the operation involving an attack on the three storied building. Also, it was important to have a support coordination system and airborne early warning (AEW) system available in case F/A-18E/F Super Hornet fighter aircraft had to be used in case of Pakistan scrambling its fighters. Apart from that a secure data link and communication relay for both land and naval forces had to be in place. A single solution for all this was available in form of E-2C Hawkeye aircraft also known as mini-AWACS. The US forces also had the advantage of having E-6 Mercury TACAMO (Take Charge and Move Out) available in this theatre. This is an airborne command post and communications relay system.

The US dependence on the space assets for strategic purposes since the 1991 Gulf War is well known. The US forces have various satellite systems to support them and they can also get help from commercial satellites. Space assets are routinely used for reconnaissance, intelligence gathering, communication and navigation.

The satellite imagery interpretation groups and intelligence monitoring groups like the National Geospatial-Intelligence Agency (NGA) and National Security Agency analyze the imagery received from the spy satellites, military satellites and commercial satellites⁵. NGA can map buildings and terrain by using specific satellite inputs. It is expected that specific agencies would have been tasked for conducting eavesdropping operations to gather intelligence.

The US forces have the Milstar satellite constellation at their service. This constellation consists of the most advanced military communication satellites. It provides secure and jam resistant communication facilities and has a global reach. In this operation it was important for the US forces undertaking the operation in Abbottabad to communicate with their superiors monitoring their activities from thousands of kilometres on a real time basis. This constellation of five satellites in the geostationary orbit would have been put into use to enable Obama and his advisors to monitor and watch the operation.

The National Reconnaissance Office (NRO) has a mandate for launching and controlling highly classified satellites. It is expected that various spy satellites under the command of NRO must have played a role in gathering and distributing relevant information. Also, other satellite constellations could have played a role as per the requirement. Given the existing availability of satellites over the region the commercial satellite imagery supplied by Digital Globe and Geo Eye spacecraft in low earth orbit should have been useful. In fact Digital Globe released two images of Osama bin Laden's compound immediately after the attack, including a snapshot that was less than four months old. This indicates that the target site had been under satellite monitoring for many months. Digital Globe analyses images from Quickbird II, a satellite with one the finest resolutions presently available in the world (provides black and white images at approximately 19 inch resolution).

The most obvious satellite technology used during this operation by US forces is Navstar Global Positioning System (GPS). Over the years this technology has become an inseparable part of various US military campaigns. In this operation obviously it played a major role in location identification and in giving navigational support to various flying machines.

There have been conflicting reports in the media regarding the jamming of all communications in the target area including electronic systems and cell phone networks in the run-up to the assault by the US. It was also reported that the electricity supply was cut-off during those 40 minutes. If this information is correct then the US forces must have used some specific jamming systems to do so. This part of the operation could even be viewed as a limited act of cyber warfare. This assessment may not be in tune with the classical definition of cyber warfare but

definitely some cyber angle would have been involved for undertaking such high precision operation.

Maybe, few CIA operatives were staying in a house near Osama's building for few days as per some media reports. They could have used telephoto lenses to take photos of the target area. The ground features in the Osama's house could have been explored by using infrared imaging equipment. There is a possibility that routine conversations amongst the people in the house could have been picked up by using various eavesdropping devices. May be a satellite radar had helped the US agencies to identify the presence of specially made underground tunnels as an alternate route for escape (if any).

Technologies and Tactics to Execution the Plan

The SEAL team commandos had specialised equipment with them to perform their task accurately. They were equipped with the night vision goggles, helmet-mounted video cameras and communications equipment linking them to aircraft overhead. Such helmet-mounted video cameras are capable of sending a stream of encrypted videos as far as thousands of kilometres. Most likely the weapon used to kill Osama bin Laden was an HK416 rifle (an M-16 type weapon)⁶, with the "double tap" of 5.56 mm bullets. Such weapons operate on gas system technologies that do not foul the weapon as in the case of various other rifles. These weapons also offer greater accuracy.

The soldiers involved in the operation were fully aware that the identification and subsequent verification of Osama (before and after being caught/killed) should be an extremely speedy process. There is a possibility that even a dog had accompanied the Seal team as a part of the operation. Dogs are the part of the few special operations teams of the US armed forces. They have been airborne for decades and jump (para or otherwise) in tandem with their trainers. Incidentally, a US Navy SEAL commando Mike Forsythe, and his dog, Cara – have a world record against their name for 'highest' man/dog parachute jump undertaken from 30,100 feet⁷. Osama's house had many rooms and it was important to identify the rooms with human presence in shortest possible time, and naturally a dog would have been a great help in this regard.

It was important for the commando force to carry out the almost real-time matching of the body features of Osama bin Laden (alive or dead) in that room. For this purpose his digital image (captured via still and video cameras) was required to be send to the main database (with Pentagon) for matching. This entire process was to be completed almost in real-time and various communication, identification

and verification would be used for this purpose. Before the final assault it was important to verify the exact locations where the helicopters were to land and the troops to be dropped. For this purpose GPS, Google Earth and other real-time intelligence inputs must have come in handy.

A surgical raid was the best option for this operation because the aim was to identify, verify and then kill Osama bin Laden. Bombing/destroying the compound was not a good option because it could have ended up in obliterating significant amount of information available in form of papers, CDs, DVDs etc. Also, the objective was only to kill Osama and capture other people live from the premises to gather maximum intelligence.

The basic intelligence to conduct such type of operation was available with the US authorities almost a month or two in advance. The raids were first on a replica of the target created in a one-acre compound in early April. Knowing the US expertise in the field of Virtual Reality (VR) which allows an artificial creation of environment using information technology tools there is a possibility that the entire operation or a part of it could have been rehearsed by using VR tools too.

Identification Technologies

In recent years, DNA technology has made significant progress as a diagnostic tool to identify the human and family history. Presently, the US military is equipped with highly advanced hand held biometric units, called Secure Electronic Enrollment Kit (SEEK II)⁸. The manufacturers of this device claim that this system is the ‘culmination of bringing core Cross Match technologies together. Combining forensic-quality fingerprint capture, rapid dual iris scan capability and innovative facial capture technology, SEEK II is a comprehensive biometric identity management solution’⁹. It is designed for wireless mobile iris, facial and fingerprint data capture. Such systems must have been put in use for the on site identification of Osama bin Laden’s body. It is known that the brain matter of Osama bin Laden’s sister, who died in a Boston hospital, was the source for the DNA matching of Osama. For off-site identification various know DNA matching technologies must have been used. It has been reported that the US agencies have technologies for sibling DNA matching which can give results in two hours.

Conclusion

The success of *Op Neptune Spear* was ensured by the technological superiority of the US forces. Thus the most extensive and frustrating manhunt was brought to a fruitful conclusion by the clever and correct usage of technology. It was an extremely meticulous intelligence operation brilliantly executed by the military.

It is an accepted fact that intelligence cases cannot be built overnight. The US agencies took significant amount of time (almost a decade!) but at the end of the day achieved success with intelligent use of technology.

This operation highlights the importance of aerospace technologies for address asymmetric threats and to undertake precision operations. It also underlines the fact that with the change in threat perception armed forces in the 21st century need to develop a mix of technologies capable of addressing asymmetric threats. It is important for states to make timely investments in various innovative and emerging technologies ranging from non-lethal technologies to stealth technologies to sensor technologies and biotechnology.



Notes:

- 1 Butt, Quaiser, "The Operation: What Exactly Happened in Abbottabad", *The Express Tribune*, May 3, 2011.
- 2 George, Roger Z., "Meeting 21st Century Transnational Challenges: Building a Global Intelligence Paradigm", available at <https://www.cia.gov/library/center-for-the-study-of-intelligence/csi-publications/csi-studies/studies/vol51no3/building-a-global-intelligence-paradigm.html>, accessed on Oct 7, 2011.
- 3 During private discussion with the author some Pakistani officials have claimed that since the state envisages no incoming threat from that particularly sector hence radars are usually not switched in that sector. May be the US forces had intelligence inputs in this regard.
- 4 Available at <http://defensetech.org/2011/05/18/rq-170-sentinel-stealth-drone-used-in-bin-laden-raid/> accessed on Jun 14, 2011.
- 5 Available at <http://www.spacenews.com/military/110503nga-chief-touts-role-bin-laden-killing.html>, accessed on May 30, 2011.
- 6 Available at <http://www.popularmechanics.com/technology/military/weapons/face-time-with-the-hk416-the-gun-that-killed-bin-laden#fbIndex1>, accessed on Jun 12, 2011.
- 7 Available at <http://www.globalanimal.org/2011/05/05/german-shepherd-belgian-malinois-bin-laden-hero-dog-is-top-secret/38799/>, accessed on Jun 12, 2011.
- 8 Available at <http://www.wired.com/dangerroom/2011/05/csi-bin-laden-commandos-use-thumb-eye-scans-to-track-terrorists/>, accessed on Jul 3, 2011.
- 9 Available at http://www.asisonline.org/newsroom/pressReleases/2010-09-28_ASIS_accolades_winners.xml and http://ddunleavy.typepad.com/the_big_picture/2011/05/biometrically-bin-laden-quantifying-the-old-adage-seeing-is-believing.html and <https://www.crossmatch.com/seekII.php> accessed on July 24, 2011.