

# An Operational Perspective of Network Centric Warfare in the Indian Context

Lieutenant General V K Kapoor, PVSM (Retd)

## A Revolution in Military Affairs

The character of war is always changing but from time to time the pace of change accelerates or appears to do so resulting in debate within the strategic community with the usual media hype. One such "strategic moment" has arrived. While everyone acknowledges that war must still be war yet few understand that it must now be waged in a noticeably different manner. In this context, Network Centric Warfare (NCW) or information based warfare is truly a Revolution in Military Affairs (RMA) which promises to fundamentally change the nature of warfare in the future. The fascination of the Armed Forces all over the world and the Indian military hierarchy with RMA is understandable. The fact that they are excited about it is evident from their statements appearing in the media from time to time. This article attempts to throw some light on NCW from an operational and functional perspective so that we do not get carried away by the diachronic (linguistic) and technical framework without understanding the operational connotations of the concept of NCW and the key technologies involved. We also have to take care that its development and application in the Indian context is done holistically for defence establishment within the national information infrastructure with all the necessary linkages so as to derive the maximum possible operational advantage for a spectrum of operations. This must extend from low intensity conflicts and terrorism to high intensity conventional conflicts under the threat of use of nuclear weapons.

The first step is to get past the definitional aspect. An all-inclusive definition can be stated as follows: *a concept of operations that generates increased combat power by networking sensors, decision makers and shooters to achieve shared awareness and synchronized activity.* Another definition states that NCW (also known as information based warfare) *is the product of convergence of certain key technologies such as computers, communications, sensors and precision fires and their exploitation to bring to bear*

---

Lieutenant General V K Kapoor, PVSM (Retd) is the former Commandant of Army War College Mhow.



*maximum combat power at the right time and the right place*". NCW uses information for the benefit of the war fighters in peace and in war. The military calls it "situational awareness" which implies awareness regarding terrain (including objectives/targets), enemy, and own forces. This information is passed from the sensors deployed on the ground, at sea, in the air and in the space (satellites, unmanned aerial vehicles, aircraft, radars etc) through broadband digital communication networks to front line units and the decision makers in the rear in real/near real time frame thus making the battlefield transparent and reducing response time. Network Centric Operations (NCO) is an umbrella term which encompasses the concepts of NCW (US), Network Enabled Capabilities (UK), Network Based Defence (Sweden), Network Enabled Capabilities (NATO) and similar terms used around the world. NCOs have also been described as high tempo, precise, agile style of manoeuvre warfare focused on Effects Based Operations (EBO) that derive their power from robust networking of geographically separated entities. EBO themselves are coordinated sets of actions directed at shaping the behaviour of friends, foes and neutrals in peace, crises and war. This implies timely, appropriate and skillful use of all or selected element(s) of national power which include political/diplomatic, economic, technological, social, psychological, information/media and military among others. Timely sharing of information and intelligence results in increased speed of command, higher tempo of operations, greater lethality and increased survivability. In essence, therefore, NCW advocates and enables integration and "jointmanship" in which the three services are lagging behind despite all their rhetoric from time to time. The final aim is to achieve strategic [political] objectives of war with the least amount of tactical effort which incidentally is also the essence of "Operational Art". Hence *"jointness" and "integration" together with innovative Operational Art are vital parameters of this type of warfare*. At the national political and military strategic levels, we are continuing underplay and ignore these issues. Our so called "jointness" is neither totally functional nor formalized.

### **Integration and Synergy**

The Group of Ministers [GOM] in their recommendations on "Reforming the National Security System" in February 2001 had stated - "The Chiefs of Staff Committee (COSC) has not been effective in fulfilling its mandate. It needs to be strengthened by the



addition of a Chief of Defence Staff (CDS) and a Vice Chief of Defence Staff (VCDS)." With greater emphasis on joint and integrated operations in the future, the system had to be reorganized with a CDS, and a VCDS together with an integrated staff, to render "Single Point Military Advice" to the Government, to administer the Strategic Forces, to enhance the efficiency and effectiveness of the planning process through intra and inter-service prioritization, and to ensure the required "jointness" in the Armed Forces. But the irony lies in the fact that the CDS has not been nominated and no operational role has been envisaged for the CDS. The Chiefs of Staff have retained their roles of Operational Commanders-in-Chief of their respective services, despite the so called "reforms". This curious and extraordinary occurrence has been generally unnoticed by the media. To understand this issue further, let us consider a crisis situation in which Cabinet Committee on Security (CCS) issues a "CCS Directive" to the COSC. The latter, after analyzing the requirements and after converting the political aims and objectives to military strategic aims and objectives, would prepare the "COSC Directive" for the Services. Now, being dual-hatted, they would receive their own directive for operational implementation, and would in turn prepare operational instructions for their respective regional commands. From here (Army/ Navy/ Air Headquarters onwards), there is no "jointness" in planning as per the present organizational structure. Each Service plans exclusively and attempts to coordinate the operational plans later at the regional command level, with the other Services. The regional command headquarters of the three services are neither co-located nor networked. Hence proper [formalized] joint operational planning and real time sharing of information picked up by various sensors of the three services is not possible at any headquarters, starting with the Army, Navy, and Air Headquarters to all levels below these headquarters. As future conflicts, especially the non-traditional variety, are likely to be characterised by selective use of force and short response timings, lack of properly integrated organisations will preclude joint operational efficiency as was evident in Kargil operations. Post Kargil controversies have still not died down but the fervour of the Services for integration and "jointness" has diminished.

### Threats And Challenges

This is an important factor for future planning. The threat from



traditional adversaries requires preparation and readiness for high intensity conventional conflicts, which are likely to be rare. In the near and mid-term the Armed Forces are more likely to fight non-traditional conflicts involving, counter terrorism on land, at sea or in the air, "Proxy Wars" supported and encouraged by adversarial neighbours, and terrorism and home-grown insurgencies as part of the turbulent internal security situation. Additionally, the Armed Forces are likely to be called upon to stabilize the volatile strategic environment around India through a benign presence and if required through force projection. Force may also have to be projected to secure our off shore assets, island territories, assets and Indian Diaspora abroad, and to assist friendly nations when invited. Hence the nature of wars, in the future, is going to compel us to think big but with smaller, more maneuverable, more precise, more agile forces and above all, integrated forces. This will also come about because technology will allow large forces to be replaced by '*precision*' and '*information*' highlighting the time factor as the critical issue.

### **Air and Space Operations**

In the context of air and space operations, the Air Force believes that the closely related concepts of Parallel Warfare and EBO are keys to threat avoidance and applying the right force to the right place at the right time. NCW will enable both. The Air Force vision and concept of operations is clearly aimed at enabling NCW by:-

- (a) Ensured use of information domain via effective information assurance and information operations.
- (b) Seamless joint machine to machine integration of all manned and unmanned and space systems.
- (c) Real time picture of the battle space, air space and situational awareness in every cockpit.
- (d) Denial of effective C4ISR to adversaries via effective information operations.

### **The Naval Operations**

Navy lays emphasis on its three dimensional operation (the space, the sea and underwater operations) and it seems that the



objectives of their proposed NCO are as under:-

(a) Enable collation, compilation and presentation of operation related data emanating from various sources at the Maritime Operations Centre [MOC] of the three commands and the transmission of fused and filtered data upstream to Naval Headquarters for further collation and presentation of a joint picture and downstream to constituent elements for a common picture.

(b) The MOC at the command level and naval headquarters should have an information support infrastructure that will enable analysis and decision support based on operations related data accessed from all available elements.

(c) At the tactical level, there must be sufficient automation for real time co-ordination of the sensor and shooter. The system must be able to pass command and control intent/orders. This requires the system to have high reliability and consistency.

(d) The system should support an extensive collaborative environment for furthering shared awareness.

### **Organisational Challenges**

A major challenge lies in the realm of our currently well defined command and control structures which would need a review because in a Net Centric Environment (NCE) the military guideline of 'one up and two down' may not remain relevant. Moreover, the dividing line between strategic, operational and tactical levels, will meet the same fate because the nature of net-centric operations will allow prosecution of operations in a simultaneous and non-linear manner, throughout the battle space, thus hastening the process of achieving the strategic aims and objectives of war.

Another challenge is that while the three services are modernizing their respective networks and suitable gateways are being catered for limited integration at appropriate levels, the communication networks existing currently do not allow the type of inter-operability required. The completion of the Defence Communications Network (DCN) which is being fielded as tri-services strategic communication network for implementation of the C4I2 concepts, will lead to the connectivity down to the Corps



Headquarters in the Army, Maritime Operations Centres in the Navy and Air Defence Direction Centre/ Airfields of the Air Force. We hope that this tri-service architecture is well conceived and developed after bearing in mind various types of operational settings derived through military strategic and operational level war-gaming.

### **Fundamental Issues**

The four fundamental requirements (capabilities) for conducting network centric operations are *Networked Communications, Information Sharing, Advanced Information Technologies such as Agents and Decision Support Algorithms and Networked Enabled Platforms (vehicles, tanks, ships, aircraft and other weapon systems)*. The Indian Armed Forces are neither integrated nor do they possess these capabilities, regardless of some "stand alone" capabilities existing within each service. Our desire to acquire the capabilities is laudable but if we wish to move along this path of an Indian RMA then our promises must be backed by agencies and agents for implementation. The military instrument of Network Centric Warfare will have to be forged on suitably integrated organizations, new technologies, joint concepts and doctrines, and joint training and joint communication architecture. Hence the important issues that the Services need to examine in far greater details are:

- (a) Jointly evolved communication architecture.
- (b) Joint/Integrated organisations.
- (c) Joint concepts and a joint doctrine to fight future conflicts.
- (d) Induction of new technologies
- (e) Network enabled platforms (tanks, ships, aircraft etc.)
- (f) Attitudinal change to accommodate the concept of NCW.
- (g) Adapting military leadership to accommodate the changing nature of war.

### **Technology**

Technology, which is one of the principle factors that drives the change in the method of war fighting is one of the most important components of NCW. India is facing an entirely new technology era, generated through advancements in the *field of miniaturisation, digitization, material science, biotechnology, sensor technology,*



*stealth, communications and information technology.* India needs to integrate new technologies as warfighting systems for which the requirement is to first evolve a new joint warfighting doctrine and concepts of joint warfighting and then decide upon the weapons and other systems to suit the former. Employment of fully integrated task forces in the future would require, in the first instance, introduction of three key technologies. The first one involves Long Range Precision Firepower on the pattern used by the Americans in the Gulf War, the war in Kosovo and in Afghanistan. *The strikes which were carried out from naval platforms, passed through the medium of air, were guided by space based assets, and struck land targets.* In the Indian context also there will be a variety of platforms. Networking of the fire power resources of the three services will ensure optimum effect on the target while the choice is left to the integrated force commander to use the most appropriate and the most effective weapons. The second dominant technology trend is in the field of Integrative Technologies. The advances in the field of communications, computers, command and control, information and interoperability [C4I2] have provided the military a capability to view the battle space as one composite whole and thus targets can be tackled jointly or singly by any weapon of any service, which is within range. *Inter-operability* will be the essence for the different C4I2 systems of the three Services. The third most important field relates to Intelligence, Surveillance and Reconnaissance [ISR] that will keep track of enemy and own forces movements through advanced sensors and platforms like aircraft, UAVs, and Satellites assisted by Global Positioning Systems (GPS).

These advances are making the battlefield more transparent and the wars more precise. Some of the key technologies, from the point of view of surveillance, in a netcentric environment are Synthetic Aperture Radar (SAR) and Hyper Spectral Imaging (HIS) and a combination of the two in a number of satellites would enable a constant surveillance capability by day and by night. Positioning of as little as four maneuverable satellites over a selected geographical area could provide battle damage assessment every six hours over a 24 hours period. Other advances in space technology such as transmission of huge amounts of data by vehicles like the Transformation Satellite System (TSAT) would enable the dissemination of large packets of data such as HIS pictures. Today it takes a few minutes to receive, typically 500 MB



data (one scene) from satellites. In the future with TSAT, at data rates of 10 to 40 GBPS the same scene would take less than a second to transmit

### **Structural-Functional dynamics of RMAs**

Military analysts have established that RMAs of all kinds, of any magnitude, and in any period are likely to share a common structure with common structural - functional dynamics. Colin S Gray in his seminal work on RMAs in "Strategy for Chaos - Revolution in Military Affairs and Evidence of History" explains nine steps in the RMA process which could assist the Indian military in coordinating and improving their integrated NCW project, if they have one. Step 1 "Preparation", implies that RMAs occur following lengthy periods of reform and extensive preparatory work is necessary. Step 2 - "Recognition of Challenge" explains that RMAs occur for a wide variety of reasons judged important. They are a manifestation of radical political - strategic reorientation which in our case was provided by the Kargil conflict. Step 3 - "Parentage" in that RMAs to be successful required political clout or the patronage of those with political clout. A case in point is of the information - led RMA of 1990s in the US where Andrew W Marshall was the intellectual parent and patron who was keenly supported by the Secretary of Defence William J Perry and Vice Chairman of the Joint Chiefs of Staff William A Owens. Step 4 - "Enabling Spark" implies that an RMA like NCW has to be constructed by revolutionary effort and for this a vital "enabling spark" is needed which may be individuals or a vital inventions. Step 5 - "Strategic Moment" spells out that RMAs typically contain a "Strategic Moment" which reveals, as in a flash of brilliance, new and exciting strategic possibilities. Such moments by themselves may not be the main event but they provide the hint of what may be feasible. Step 6 - "Institutional Agency" explains the need for RMAs to have agencies and agents for implementation. These include appropriate military organisations and with suitable military cultures, joint doctrines and innovative operational concepts derived through "Operational Art" and intensive training. Step 7 - "Instrument" describes that not only do the RMAs have to be conceived and forged but their military instruments also have to be procured. Regardless of the potency of the military instrument it has to be of a size which is appropriate for executing operational concepts in the Indian context. Step 8 -



"Execution and Evolving Maturity" clarifies that the only test that really counts, in the pragmatic world of strategy, is the detailed consequences of the use of the RMA i.e. its trial by combat. This step essentially refers to the military and strategic effectiveness achieved by implementing the RMA. Step 9 - "Feedback and Adjustment" must have the potential of fuelling a complete renewal of the RMA cycle.

The nine steps explained above are just an analytical tool and could be termed as a conceptual tool kit for understanding an RMA process such as the NCW. It needs reiterating that the NCW phenomenon, involves much more than mere networked communications. In fact it involves a totality of systems, which can be abbreviated as C4I2SR [command, control, communications, computer intelligence, interoperability, surveillance and reconnaissance]. Our Armed Forces would do well to study this phenomenon carefully and conduct the developmental process through tri-service integrated enquiry, research and analysis to arrive at contextual frameworks and structures for NCW. This is also an area where our strategic convergence with the United States must help us in obtaining the technologies that we lack through direct transfer or through joint development projects.

### **Cost And Complexities**

The cost and complexities of such a project will not allow all platforms of the Indian military to be network enabled simultaneously and hence priorities will have to be laid down. As far as the Army is concerned, priority should be given to offensive formations as these may be called out at short notice to deal with developing crises. Selected offensive formations should be network enabled in the first instance. Let us, for instance, take the example of a Motorized Infantry Division Group [a future thought]. In such formations 100 percent Command and Control and Combat vehicles will be network enabled while troop carrying, repair and recovery vehicles and logistics vehicles may be networked selectively. The key factor should be that when networked even 60 to 70 percent solutions should deliver a capability that far out strips the sum of its parts. This will also happen when ground, air and naval platforms are networked and placed under integrated commands. The Army must also think of flatter organisations as both the nature of future wars and future technologies suggest such a solution.



While each Service should plan to conduct intra-service trials for their respective C4I2SR systems, inter-service developments should be conducted apace. I recommend an inter-services team of dedicated professionals from the operational side, with some technical "bright sparks" along with scientists of the Defence Research and Development Organisation (DRDO), at the level of Colonels and equivalents under a two star General/Admiral/ Air Marshal, be formed immediately to look into all aspects of interfacing and interoperability under the aegis of the Integrated Defence Staff. As far as an Inter-Services "test bed" is concerned, an integrated command such as the **Andaman and Nicobar Command** could be nominated. They should have under them the tri-service military instrument of "Force Projection" comprising operational formations of all three Services. This experience can later, after due modifications, be applied to other force levels on the continental land mass of India or for other contingencies outside the Indian Boundary limits.

## Conclusion

It is quite disconcerting to note that the three services are progressing on the path of acquiring networked capabilities individually with no coherent framework for a tri-services information architecture. Currently, the Indian Armed Forces have a long way to go to achieve a capability for net-centric warfare despite the fact that the 'strategic moment' for change had arrived. Hence what is required is to establish agencies and agents for implementation within each service and for effective tri-service architecture. The cost of transformation will be formidable hence tri-service organisational synergy and prioritization of resources will be vital aspects of development. Military and Political awakening and acceptance to bring about this change is a fundamental necessity.