RECOMMENDATIONS

It is evident that the challenges posed by the sea are vast, complex and uncertain. This calls for a coordinated, centralised and sensible development response by all sea related organisations of Bangladesh. A realization of the significance of the maritime sector requires a pragmatic approach and is an important national requirement for protection of our vital maritime interests. Unfortunately, the wealth that could accumulate with the development of Maritime Sector, have been denied to Bangladesh due to land-oriented mindset and maritime unawareness of the policy makers. Now, the time has come to pay immediate attention to this sector and to make up years of neglect. It requires the understanding of the subject from the right perspective and adopting a positive attitude for the promotion of maritime awareness in the policy makers. Accordingly, the following measures are recommended:

a. The country needs to settle the problems of fixing its maritime boundaries with its neighbours and should prepare to face and convince international authorities in this regard. Concerted effort should be initiated immediately prioritizing this in the national agenda and not aiming to merely hold talks or arrange visits by the officials but making substantial progress towards the delimitation of maritime boundary and maritime zones e.g. EEZ and CS.

b. Increasing threats of illegal exploitation e.g. smuggling, piracy, drug-trafficking, pollution, terrorism etc. demands a comprehensive approach to surveillance and monitoring the limits of the country's maritime zones for effective law enforcement. But at present, neither the Navy nor the Coast Guard is capable of effective surveillance in the entire EEZ. As such, Bangladesh Navy and Bangladesh Coast Guard need to be modernised to keep parity with the state and non-state threat scenario as per the 'Forces Goal'.

c. The maritime infrastructures and organisations of the country need to be appropriately augmented by people with maritime knowledge and maritime awareness. The capacity of various maritime infrastructures including seaports should be upgraded.

d. Bangladesh should formulate an integrated maritime policy covering all domains of maritime aspects. A standing committee on Maritime Security Affairs should be formed and should function with common objectives under an integrated maritime policy.

e. The common people of Bangladesh need to be made conscious of the

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importance of the maritime security through extensive public relations and using mass media. Media needs to be more focussed on the maritime activities. The maritime institutions should form a media organization of permanent nature to project maritime activities, crimes state, action and the potentials to the mass. This will ultimately sensitize the people and policy makers and help in strengthening national maritime security.

f. Officers joining the civil service through Public Service Commission should undergo maritime orientation program with the Navy during their training period.

g. Lessons on maritime interest should be added in national education syllabus to inculcate knowledge on maritime issues to the future generations. Seminars may be organised on regular basis by the maritime institutions to highlight the problems and promote the prospects on the maritime affairs.

h. Policy makers of maritime institutions and regulatory bodies need to address the above issues sincerely.

CONCLUSION

Maritime security is multidimensional and multi-faceted involving both military and non-military issues. The origin of these issues is again rooted in the perceptions of a nation's maritime interest. Being a coastal nation, Bangladesh's maritime interest revolves around asserting territorial integrity and using the resources of the sea for sustained development of the country. Various issues affect the maritime interest of Bangladesh. Firstly, the modernisation drive of neighbours' navies and increasing involvement of extra-regional powers in the maritime scenario have been posing greater naval challenges than before. Secondly, growing international trade is posing infrastructural and safety challenges on the economic front. Bangladesh's seaports are suffering because of inefficiency and inadequacy. Numbers of FOC vessels ply at the ports, which creates a security concern. Infrastructural weakness of sea-based resource exploration and exploitation challenge Bangladesh's ability to pursue economic emancipation strategies. Besides these, technological development and environmental disasters also affect maritime security of Bangladesh.

Free access to the sea is the gift of nature to Bangladesh. It can safely be said that maritime affairs must be given a very important place in the national policies. The present economic situation of the country has also been compelling us to

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enhance the maritime awareness amongst the people of our country and in particular the policy makers of maritime affairs. Unfortunately, the riches that accumulate in the maritime sector have been denied due to land-oriented mindset of the decision-makers. Bangladesh's failure to develop its maritime potential over the last thirty seven years has caused a serious dent in the economy. The country may continue to pay a high price for such failures in the future if the realization on this issue is not developed and appropriate measures are not taken to redress the situation. It is needed to lay down a positive maritime policy workable within the available financial resources and to develop maritime infrastructure along the coastline. The sea can provide us much needed economic prosperity with much less investment and ultimately, it can contribute to building strong defense for the country.

A multi-layered approach is necessary to ensure maritime security. As a national response strategy, Bangladesh should maintain deterrence capability, create maritime multi-agency information base, generate maritime consciousness, formulate integrated maritime policy and enhance capacity of various maritime infrastructure to implement the integrated maritime policy. Coupled with these responses, the focused presence of naval and coastguard can tackle the hardcore threats both from the state and non-state actor. It must also be recognized that the indivisible nature of the seas demands both bilateral and regional cooperation to address the translational issues. On the bilateral side, various trade protection measures like CSI, ISPS Code, ship alert system etc should be implemented. Again, bilateral CBM will reduce sovereignty sensitivities paving the road to regional cooperation. Regional cooperation can start with sharing of intelligence, joint patrol etc and may land up in cooperation in oceanographic research and joint fishery exploitation. Once such a congruent environment is created, regional governance can take place.

Author

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Security Through Knowledge

Network Centric Warfare: Myth or Reality for Bangladesh Armed Forces?

NETWORK CENTRIC WARFARE: MYTH OR REALITY FOR BANGLADESH ARMED FORCES?

Lieutenant Colonel Mohammad Quamrul Islam, afwc, psc

INTRODUCTION

In today's information age, the rapid development of technology has necessitated the concept of sharing information easily. With the worldwide expansion of information technology, the military warfare too has stepped into a digitised battlefield environment particularly in command, control and decision making. 'Network Centric Warfare' (NCW) has thus added a new dimension in the spectrum of command, control, communication, computer and intelligence (C4I) systems. NCW can be simply explained as the means of quick flow of information to assist in making quick decisions to execute a mission. In the Bangladesh Armed Forces, however, the concept of NCW has not yet been materialized. Nevertheless, it is indeed very useful for any force likely to get involved in future warfare. NCW enhances fighting power and acts as a force multiplier in the battlefield. The basic fundamental of NCW is to generate shared battle space awareness through synchronization of battlefield operating systems.

To build a military network centric scheme, reliable, robust and secured communication infrastructure is essential. In developed countries, NCW is based on the sensors, satellites and modern equipment. Though Bangladesh does not have its own satellite system, the information structure for NCW may be developed with the available communication facilities such as, fibre-optics networks, micro-wave links, hired satellite links etc. The key move would be to establish a network between all the agencies to transfer data, voice and video through interfacing links. NCW has significant implications in conducting military operations as it provides unique opportunities in command and control and self-synchronization by commanders at all levels. Many countries, including USA, UK, Canada, Australia, India and Pakistan, have introduced NCW to enhance the synergetic effect in the battles pace. Currently, the Bangladesh Armed Forces may not be able to operate fully in the NCW environment; however, an effort may be taken to introduce the concept of NCW on a limited scale. A well-thought out programme should, in fact, be undertaken to transform the concept of NCW into reality.

Aim

The aim of this study is to throw some light on the necessity of conducting NCW and suggesting options for implementing NCW by the Bangladesh Armed Forces in the future.

What is NCW?

NCW is the emerging theory of war in the information age. It is defined as the information superiority-enabled concept of operations that generates increased combat power by use of networking sensors, enabling decision makers and field commander to achieve greater shared awareness, increased speed of command, higher tempo of operations, greater lethality, increased survivability and a higher degree of self-synchronization.[1] NCW is the combination of Network-Centric Operations (NCO) which is enabled by the networking of the forces.[2] It provides a force with the access to new and previously unreachable information domains. It is a process which correlates information sharing and situational awareness; therefore increases the speed of decision making. NCO also focuses on the tactical and operational levels of warfare, but its impact spills over all levels of warfare starting from the tactical to the strategic. At the operational level, NCO provides commanders with the capability to generate precise war-fighting effects to maintain operational tempo. NCW offers the following advantages:

a. A robustly networked force that improves information sharing.

b. It enhances forces' capability for shared information awareness.

c. It augments speed of command.

d. NCW increases mission effectiveness.

A Conceptual Framework of NCW

A military leader should understand the correlation between information and combat power. To analyze this relation, a conceptual framework is required to be drawn describing how the information network can be leveraged to increase combat power. A conceptual model has been developed recently that focuses on characterizing the relationships between shared information, shared situational awareness, and highlighting the processes of collaboration and synchronization.[3] A key element of the model is the focus on three domains: the physical domain, the cognitive domain, and the information domain.

a. **Physical Domain.** The physical domain is the traditional domain of warfare. It is the domain where strike, protect and manoeuvre takes place across the environments of ground, sea, air and space. All the physical elements of a force are robustly networked with secured connectivity. The important metrics for

1. David S. Alberts, John J Garstka, Frederick P. Stein, Network Centric Warfare- Developing and Leveraging Information Superiority, CCRP, USA, 1999, p.2
2. Office of Force Transformation, Implementation of Network-centric Warfare, US Department of Defence 2005, p.3
3. Alberts David, Garstka, Hayes Richard and Signori David, Understanding Information Age Warfare, CCRP, 2001, p.8

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measuring combat power in this domain are lethality of weapon, extensive use of sensors and survivability of the forces.

b. **Cognitive Domain.** In the cognitive domain, a force has the capability to develop a high quality of awareness and share it. The forces have also the capability to develop a shared understanding, including commander's intent. It helps the force to increase their self-synchronized capability in any operation. The objective of the NCW is that a force with their attributes and capability should be able to generate increased combat power by:

(1) Achieving better synchronization effects in the battle space.

(2) Achieving greater speed in command.

(3) Increasing lethality, survivability and responsiveness.

c. **Information Domain.** In the information domain, a force must have the capability to share access and protect information to a degree that it can establish and maintain an information advantage over an adversary. The force must have the capability to collaborate in the information domain which will enable it to strengthen its intelligence collection process.
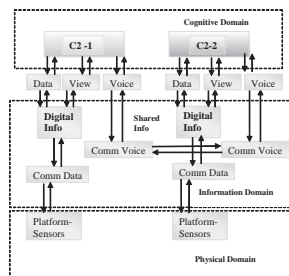

Figure 1: Conceptual Framework of NCW
(Source: John J. Garstka, NCW: An Overview of Emerging Theory)

Capability of NCW

When warfare is represented in the information, cognitive and physical domain, the application of a multi-domain approach can assist in identifying complex relationships between shared information, shared situational awareness, and increased combat power. The power of NCO overrides existing concepts of platform-centric operations. In the following models, the power of NCO over platform-centric operations is illustrated:
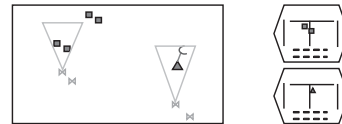

Fig-2 Own Aircraft Detects Enemy Aircraft and Radar Station **Fig-3** Platform-Centric Display
(Source: Department of Defence Report to Congress- Network-Centric Warfare, 27 July 2001)

a. **Model 1.** To describe the performance of platform-centric operation in Figure 2, it is shown that one of four own aircrafts has detected two of the enemy aircrafts and another own aircraft has identified an enemy mobile radar station. Individual pilots who maintain their self-synchronized capability would pass the information which may not be observed by others. In the display panel the information sent by the single platform is shown which presents information sharing in the physical and communication domain only.
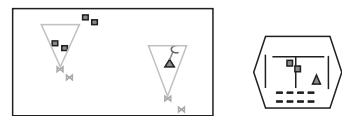

Fig-4 Own Aircraft Detects Enemy Aircraft and Radar Station **Fig-5** Network-Centric Display
(Source: Department of Defence Report to Congress- Network-Centric Warfare, 27 July 2001)

b. **Model 2.** In Figure 4, enemy aircrafts and mobile radar station detected by own aircrafts is digitally displayed by the NCO; the information is then shared by all the platforms. The inputs of the information are based on direct observation in the physical domain, indirect observation by onboard sensors and voice communication; that is to say a combination of physical and information domain and decisions taken to neutralise targets in the NCO-cognitive domain. In network-centric display, all can observe integrated target acquisitions. Thus the process enhances the capability of NCO in terms of sharing information and faster decision making.

Implication of NCW in Conducting Military Operations

Combat power at the tactical level provides greater opportunities to operational commanders in employing their forces with increased flexibility. NCW can offer a commander enhanced capability in deciding the sequence of battle and the nature of engagements. It accelerates engagement cycles and operational tempo at all levels of a war fighting system. A high speed network permits error free transmission at the fraction of time required for voice transmission, and permits transfer of a wide range of data formats.

The faster the information is collected, analyzed and disseminated; the faster decision can be taken. A well-coordinated networked-force can contribute to improving effectiveness in many ways. One of the ways that can be adopted is 'self synchronization' that permits 'directive control'. Instead of micromanaging operations with close control via command links, commanders are given significant autonomy, defined objectives, and they are allowed to take the initiatives necessary to neutralize the objectives in directive control. A fighter pilot who receives continuous updates from an Air Defence Operation Centre over a network can then take his own tactical decisions and exploit the situation instantly.

NCW as Practised by Advanced Military Forces

USA. Whe the US Military conducts operations worldwide its C2 system is connected with a robust network to monitor the global situation so that it can employ its forces with economy of effort. The NCO of the Military of US spreads over the globe and its system works on 'Global Information Grid (GIG)'. Basically the network operates with sensors and actors broadcast through satellite, and cable and radio communications. The sensors of different platforms are interconnected with data-link; all information is received and processed though command centres and the platforms are then diverted to engage their targets. This concept of NCW provides the opportunity of information sharing and increases the capability of the force. The NCW capability was tested by the US Central Command in 'Operation

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Enduring Freedom' in Afghanistan and 'Operation Iraqi Freedom' and proved to be very effective during operations.[4]

India. The Indian Army's principal modernization initiative has been to move into digital battle space, thereby opening its doors to NCW[5]. The Indian Army doctrine, following certain key concepts, provide these basic NCW guidelines:[6]

a. A virtual sensor grid that provides a 'grid of capabilities' overlaying the battlespace instead of a series of independent single sensors. This grid is termed as the 'Surveillance Grid'.

b. To leverage the strength of worldwide telecommunications infrastructure, all communication networks are viewed as virtual grids overlaying tactical, operational and strategic areas. This grid is referred to as the 'Communications Grid'.

c. An abstract grid that comprises weapons available, sorted by suitability and availability against a hostile order of battle is termed as the 'Tactical Grid'.

The Indian Armed Forces have adopted the concept of NCW fully. The connectivity of the forces is maintained by satellite and fibre-optics backbone through voice and data link. The forces share real time information collected by various sensors fitted with aircrafts and ships, Unmanned Aerial Vehicles (UAV) and radars.

Feasibility to Conduct NCW- Bangladesh Armed Forces Perspective

By looking at the rapid adaption of NCW by advanced armies and understanding the necessity of information sharing in the battlespace, we can conclude that the Bangladesh Armed Forces should develop NCW capability as soon as possible. If the Armed Forces are to be involved in future war, its operations must be characterised by domination of battle space with increased situational awareness, more use of electronic devices and precision weapons and by extending its range of operations.[7] In the Bangladesh Armed Forces, the information is generally passed following the hierarchy of command, i.e. Battalion Commander to Brigade Commander, Brigade Commander to Division Command to Land Component Command and to Joint Force Commander. This process of disseminating information is time-consuming and complex. That is why NCO are required to be updated for increasing speed of command.

4. Office of Force Transformation, Implementation of Network-centric Warfare, US Department of Defence 2005, p.33
5. Lieutenant General Davinder Kumar VSM Bar, Signal Officer- in- Chief, Indian Army, Seminar on Infostructure for Network Centric Warfare, Delhi, 2004.
6. Headquarters Indian Army Training Command, Indian Army Doctrine, Shimla, 2004, p.21
7. Christopher J Bowie, Robert P. Haffa. Jr. and Robert Mullins, Future War: USA: Grumman Corporations, 2003, p.4

Adopting the concept of NCW is very feasible for the Bangladesh Armed Forces. In fact, the process of connecting the forces has begun. The Bangladesh Air Forces has already established the process of setting up networks between installations and bases and their objective is to incorporate sensors in the aircraft for receiving real time scenario of the battlespace.[8] The Bangladesh Army also has a plan to develop the concept of networking its forces. The Signal Directorate, in Army Headquarters has taken a project of establishing micro-wave and fibre optics network to bring the divisions into a common network. A project of video conferencing has already been undertaken.[9] The Bangladesh Navy too, is planning to incorporate link-Y system in ships and on shore to establish inter-connectivity because of all of these communication facilities, adopting the concept of NCW is practicable for Bangladesh Armed Forces.

Existing and Future Communication Structure to Support NCW

Currently, communication between the armed forces is maintained through microwave fibre-optic link which provide wide range of connectivity over the battlespace. The existing communication facilities are as following:

a. **Falcon Eye- Microwave Project.** The Bangladesh Air Force (BAF) has established micro-wave connections between its bases and radar units. The Bangladesh Army has also connected all the divisions of the plains and Hill Tracts with a combination of micro-wave and fibre-optics using 'Falcon-Eye' connectivity. This microwave project may be utilized for sending data, voice and video.

b. **Fibre-Optics of Bangladesh Telecommunication Limited (BTCL).** BTCL has also established fibre-optics backbone in the north-western, north-eastern, northern and south-eastern sector of Bangladesh. It also plans to connect the southern and south-western sectors of the country with fibre-optics. In the next 5 years, BTCL will connect all the Upzillas. BTCL fibre-optics has bandwidth of 61 E1 which offers a huge capacity. The future plan is to establish communication nodes at the Upzillas and Districts where the units and brigades generally operate in their respective operational areas of responsibility.[10]

c. **Satellite Communication - Bangladesh Telecommunication Regulatory Commission (BTRC).** BTRC has undertaken a project to launch or hire a

8. Air Marshal Shah Mohammed Ziaur Rahman, ndc,fawc, psc, Chief of Air Staff, an interactive session with the course members of AFWC 2008 on 21 May 2008.
9. Brigadier General Rafiqul Islam, ndc, psc, Director Signals interviewed on 22 Jun 2008.
10. Brigadier General Rafiqul Islam, ndc, psc, Director Signals, interviewed on 22 Jun 2008.

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satellite and this is likely to be implemented within 5 years.[11] This project is under consideration. However, hiring a satellite channel for military use is also a probable solution. If Bangladesh launches its own satellite, a few channels may be dedicated for military use. Satellite connection is most suitable to conduct NCO. The networked forces need to have satellite transmitters and receivers. It would cover a wide range in land, air and maritime space.

NCW Architecture for Bangladesh

NCW is highly dependable on the interoperability of communication equipment, data and software to enable networking between forces, and between manned and unmanned platforms. For Bangladesh, part of the NCW technology will rely on line-of-sight radio transmission through microwave links while the other part of the technology will aggregate information for transmission through fibre-optics backbone. Therefore, the connectivity will be a combination of microwave link and fibre optics backbone until satellite support is available. The designs for this technology must enable stable communications between the services and rapid sharing of data and information between mobile platforms and sensors. In the future, the connectivity may be established via satellite through satellite phone, VSAT, global positioning transmitter and receiver or Forces Command Brigade and Below (FCB2). FCB2 and Blue Force Tracker (BFT) are the electronic devices which give the location of own and enemy forces in the digital map which are generally fixed in any type of military vehicles.[12]

Network-Centric Connectivity and NCO of the Armed Forces

To establish the communication network, the components of Armed Forces need to be connected with the communication nodes and terminals. The nodes and the terminals will be connected with the central server which will enable all recipients to share information. The primary objective of such connectivity is to bring as many components to the same network system as is possible within the existing communication facilities.

Ideally, all levels of the Land Component should be connected with the satellite communications system to receive real time battlefield scenario, but this would be an expensive project for the Bangladesh Army. Initially, however connecting brigades and divisions with the central server by combination of fibre-optics and micro-wave links may serve the purpose. At brigade headquarters, the information may be fed to a computer having software of Geographic Information

11. Mr. Mohd Moklesur Rahman, Senior Consultant, Telecommunication Engineer, BTRC interviewed on 24 June 2008.
12. Office of Force Transformation, Implementation of Network-centric Warfare, US Department of Defence 2005, p.36

System (GIS) where the data of own and enemy will be plotted on the digital map. Division headquarters will be connected with the central server of the Army Headquarters. Thus the information can be shared within the services. It may be mentioned that Division Headquarters will have the prerogative to add or delete required data in the digital plot map. In case of satellite connections, brigades may use FCB2 to send data, voice and video via satellite transceiver directly to the division and Army Headquarters. At the tactical level, for collecting information, battalions should have ground surveillance radar system (GSRS) and the required data is to be sent to the brigade.

A Naval platform which has sensors and is connected to the bases via satellite is the best option for the maritime components. At sea, communication can be established between the flag ship and the other ships through various radio wave links. The flag ship can directly communicate to Naval Headquarters. Bangladesh Navy has a few platforms capable of carrying out limited scale of NCW. All ships may be fitted with tactical data link-Y and Tele-Type Writer (TTW) data link facility. The Link-Y terminal transmits tactical information to all other units through radio transmitters.

The air platform may be equipped with sensors to send real time pictures. Preferably, 'Airborne Warning and Control System' (AWACS), 'Joint Surveillance and Target Attack Radar System' (JSTARS), surveillance aircraft and UAV should be used to acquire a real time battlefield scenario. Since these platforms are expensive, the option of airspace surveillance seems to hold little hope for us. However, sensors like ground based and platform radars may be utilized for gathering information.

Requirement of Software and Hardware to Integrate the Network

To establish integrated connectivity of NCW, GIS may be used. It is an integrated hardware, software and data that can create, manipulate, and analyze a geographically referenced database to produce new maps and tabular data. It is used to digitally reproduce and analyse the features present on the earth's surface.[13] In GIS, a relationship between the graphic map data and the tabular database is maintained so that the changes to the map can be reflected in the database. GIS allows automatic determination of the relationships between maps, and can create new maps out of those relationships.

By integrating sensors like UAV and ground surveillance radar with GIS, the real time scenario of the battlespace can be sent via microwave link, fibre-optics, and VSAT or satellite phone. Thus forces can be brought into the integrated

13. A GIS is integrated system of hardware, software and data, http:// www.gis.com

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network system. For the land forces, satellite transceiver mounted on vehicle is more useful to sending and receiving data, voice and video. The position of own and enemy forces can be determined by the global positioning system and the FCB2. Aircraft fitted with aerial surveillance radar or UAV will be required to identify enemy locations. Movement of the enemy can also be acquired through real time satellite picture.

Options of NCW Connectivity

For the Bangladesh Armed Forces, there are mainly two options available in establishing the connectivity:

a. **Option 1.** Using the existing micro-wave and fibre optics, the forces can be connected in a scheme of virtual collaboration. The terminal end of this network should be brigade headquarters, all radar stations and naval bases, as shown in Figure 6. In exercising this option, it would be difficult to bring a battalion within this network as its location will be frequently changed during battles. Brigade staff will collect all information and put the data in computer's customised software that is connected to the nodes and the central server.
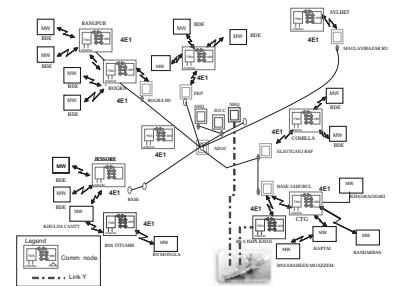

Figure 6-NCW Connectivity-Option 1
(Source: Prepared by Author)

This is how information could be shared between all networked forces.

b. **Option 2.** Option 2 is to establish connections among the forces using the satellite system. In this option any force having satellite transceiver can be connected to the network. Brigade and division headquarters, bases, flotilla and ships possessing it, would be able to transmit and receive data through satellite. There are two ways of using satellites: firstly, BTRC can launch its own satellite and the Armed Forces can use its channels and secondly, Bangladesh Army may rent a satellite channel from friendly countries. A proposed network of option 2 is shown on Figure 7.
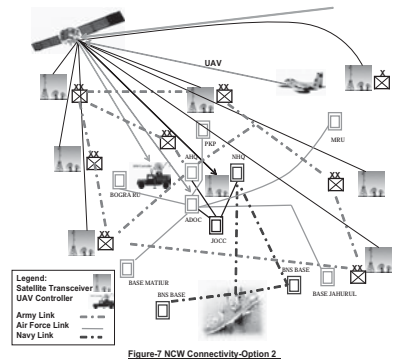

Figure-7 NCW Connectivity-Option 2
Source: Prepared by Author

Implementation of NCW In Bangladesh Armed Forces

NCW has the potentials to transform our approach to assigned missions and achieve worthwhile improvement in effectiveness and efficiency.[14] However, making NCW a reality requires clear understanding of its implication. Bangladesh Armed Forces with its present communication resources should initially undertake small scheme of NCO to test its effectiveness.[15] There are two key prerequisites for success; developing innovative NCW concepts and transforming them into real operational capability. Therefore the approach to NCW for Bangladesh Armed Forces should be as following:

a. Short-term Scheme.

(1) **NCW Awareness.** Around 90 percent of Armed Forces officers are not familiar with NCW.[16] Only a few officers of Army, Navy and Air Force from signal directorate have carried out studies and undertaken small projects to test the interconnectivity of elements within the forces using existing communication facilities. Therefore, for general awareness, a full scale programme consisting of study periods, seminars and workshops should be organised.

(2) **Training on IW.** To understand the IW capability, personnel of Armed Forces should undergo formal training on IW related subjects, particularly on NCW. Such subjects could be included in the military course curriculum.

(3) **Integration of Communication Facilities.** Existing communication systems must be integrated and all forces should be placed under a common net. For that reason, a interoperable communication system may be procured for all the services.

(4) **Test and Trial of NCW Project.** A small scale NCO may be launched to test its function and effectiveness. The communication instrument of all services should be able to work under same network.

b. Mid-term Scheme. If the result of the field test is proved to be successful, a mid-term scheme may be undertaken:

(1) **Establishing a Robust Communication Network.** For NCW, a robust communication network needs to be established. The existing structure should be further strengthened by adding satellite communication and incorporation of GIS facilities.

14. Alberts David and Hayes Richard, Power to the Edge, Washington DC, CCRP publication, 2005, p.193
15. Brigadier General Rafiqul Islam, ndc, psc, Director Signals, interview on 22 Jun 2008.
16. A survey carried out taking opinion of 40 officers of different rank of Armed Forces.

(2) **Developing Software.** To share the information, a common software need to be used by all. A company may be hired to develop this software.

(3) **Conducting NCO.** Once the project is ready to be implemented a full scale NCO may be conducted by a joint force to finalize the concept and doctrine of NCW.

c. Long-term Scheme.

(1) **Improved Communication Facilities.** If Bangladesh launches its own satellite, the Armed Forces can share a channel or satellite, communication could be established between the forces upto battalion, squadron and flotilla level. However, the hired satellite channel could also be used for military purposes.

(2) **Articulate Doctrine on NCW.** Basing on the performance of NCW and its effectiveness, a doctrine can be developed on NCW.

(3) **Development in IT.** Since the information age is advancing rapidly, continuous update of technology will be required. Therefore, research and development in IT must be pursued.

The Concept of NCO for Bangladesh. The basic concept of NCW is to have shared battlefield awareness through the network. NCW is therefore implemented for better synchronization of events for achieving greater speed in command and for increasing lethality, survivability and responsiveness. For Bangladesh, the available communication means need to be integrated through command nodes, and connectivity must be assured between battalion/frigate/squadron, brigade/division/bases and services headquarters. The central command node should be located in the Joint Operation Command Centre to enable it to receive all required information to predict battlespace situations. The joint forces operating dispersedly will share common picture of the battlespace, which knowledge will then assist commanders in making decisions. Customised software will collate all the information sent from the nodes and the central server will display the location and activities of own and enemy forces. The command control authority will remain with the respective commander; however, the higher commander can always superimpose his decision or modify his concept of operations based on the rapid development of situations.

Training for NCW

In the short-term scheme, the general awareness and training should get the priority. The objective of this training will be to familiarise the officers and soldiers with the NCW and to provide adequate knowledge for them so that they can operate in NCW environment. A group of officer and soldiers should be trained to

establish communication structure and maintenance. As the concept of NCW involves the relation between the sensors, shooter and the decision-maker, training programme should be organised for the soldiers to enable them to learn about the function of sensors and action taken after receiving the decision. The technical personnel will be trained in computer software, establishment of data-links, satellite functions and communication connectivity. At the decision-making level, the senior officers must understand the concept, procedure and techniques used to operate electronic equipment and in the decision-making process. The following training schemes could be organised:

a. **Basic NCW Training.** This common training programme could be organised for all soldiers to impart basic lessons on NCW. The terminal objective of this training will be to acquaint all soldiers with the NCW environment so that the method of NCO can be applied in the battlefield, i.e. the relation between the physical and cognitive domain of NCW should be taught.

b. **NCO Technical Training.** The training programme is for technical personnel involved in establishing communication network and maintenance. Knowledge and skill in computers, satellite connectivity, programming, data-link connections etc should be made prerequisites to undertaking this training. The objective of this training is to develop a skilful those technician who can operate communication networks.

c. **Officers Technical Training of NCW.** The objective of this training is to prepare qualified officers to establish and sustain network connectivity. Technical training will impart lessons in computer programming, developing software, planning and setting up the networks between the forces. This training may be conducted at Military Institute of Science and Technology (MIST).

d. **Senior Officers' Training on NCW.** The objective of this training is to acquaint senior officers with the doctrine, theory and concept of NCO. The training will enable a commander to understand the procedure of sharing information in the battlespace and it will also allow them to understand the decision-making procedure involved in NCW.

RECOMMENDATIONS

The Bangladesh Armed Forces has already taken up some steps in the line of NCW. But the project is still in its infancy. If the Bangladesh Armed Forces agrees to develop full-scale NCO capabilities, the following measures should be taken into considerations:

a. A group of experts should further analyse the requirement of NCW, its concept, modalities, equipment and budgetary requirements.

b. A general awareness programme about NCW should be undertaken in the Armed Forces to familiarise all with the subject.

c. A perspective plan for integrating all communication resources and establishment of information structure should be undertaken immediately to bring NCW in reality within the next 5 years, which falls under short and mid- term schemes.

d. A Satellite channel including GIS hard and software should be hired to carry out field tests of NCO.

e. Local software engineers could be employed to develop software of NCW.

f. To implement the concept of NCW, a groups of personnel (military officers, technical persons and civil software engineers) could be sent abroad for training.

g. A doctrine on NCW can be formulated which will enumerate the modalities and application of NCO during peace and war.

CONCLUSIONS

As one of the important subjects of 'Revolution in Military Affairs', NCW has given the opportunity to the Armed Forces to better connect people and war fighting machines. It can contribute to reduce Clausewitz's 'fog and friction' in warfare. NCW helps the commanders to obtain and share information which ultimately can increase speed of command, control and execution in the battlespace. The concept of NCW is based on information sharing to develop the situational awareness during wars. The process acts as a force multipliers like other tenets and provides opportunity to self-synchronize commander's action that can enable him to maintain operational tempo.

NCW has not yet been fully materialised in many developed countries. But the value of conducting NCO in future wars is well understood by now. However, the perception and implementation of NCW will take time to bring it into reality. The necessity of information gathering and sharing in the thick fog and friction scenario can only be realised by a commander when he strives for the critical information required to make a decision. Therefore, efforts should be taken to provide all available information to a commander, which is only possible by adopting the concept of NCW.

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IMPACT OF INFORMATION TECHNOLOGY (IT) ON REVOLUTION IN MILITARY AFFAIRS (RMA) IN BANGLADESH PERSPECTIVE

Wing Commander Md Alamgir Hossain, afwc, psc

INTRODUCTION

The nature of war never changes; "war," after all, "is an act of force to compel our enemy to do our will," as Karl Von Clausewitz stated over a century and a half ago in his book "On War"[1]. But the manner in which war is conducted has undergone considerable changes. Sometimes these changes are so dramatic that war itself must change its form. Indeed, a historical discontinuity or revolution can occur in the way war is fought. There were a number of revolution happened in military affairs in the history. But it is important to remember that independent technologies or innovations alone cannot bring the Revolution in Military Affairs (RMA). RMA occurs when a combination of technological, organizational, social, doctrinal and politico-economic changes take place in conjunction and affect the way militaries plan, equip and train themselves to wage war.

The current RMA is driven by technology, namely Information Technology (IT). The often-quoted definition by Andrew Krepinevich says that RMA occur when "... the application of new technologies into a significant number of military systems combines with innovative operational concepts and organizational adaptation in a way that fundamentally alters the character and conduct of a conflict. It does so by producing a dramatic increase - often an order of magnitude or greater - in the combat potential and military effectiveness of armed forces."[2]

Toady any topic on military, strategic, or national security invariably promotes the concept of emerging IT-based RMA. The essence of the IT-based RMA is that it provides increase in the combat capability of armed forces "orders of magnitude" over any potential adversary who has not mastered it.[3] The current RMA includes different kinds of new tools and processes of waging war, like Information Warfare (IW), Network Centric Warfare (NCW), Integrated Command and Control (C4ISR), System of Systems, all of which are backed by IT.

Whatever else RMA is about, its primary emphasis is on the enhancement of military capability. But RMA has been neglected in Bangladesh Armed Forces because of many reasons. Considering the technological development of other

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countries in this region, we need to prepare ourselves to face the variety of warfare tools that might be employed against us in the future conflict. As such, it is time for the Bangladesh Armed Forces to focus on possible changes required in its doctrine, organization and training for operational adaptability with the development of IT and IW to derive all possible benefits of RMA to face the future challenge for the armed forces and for the national security.

AIM

The aim of this paper is to analyse the impact of emerging IT on RMA, identify its implication on doctrine, organization and training, and suggest possible changes to address the RMA issues in Bangladesh perspective.

UNDERSTANDING THE REVOLUTION IN MILITARY AFFAIRS (RMA)

Basic Understanding about RMA

A number of revolutions have happened in military affairs over the years. In the 20th century the development of the mechanized tanks, carrier aviation, submarines and strategic bombing have had a tremendous impact on military concepts and warfare. The induction of the atomic weapons in 1945 led to another military revolution. In considering past RMAs, it is important to remember that independent technologies or innovations are themselves not responsible for bringing about RMAs.[4] The development of the tank did not produce an RMA. Only when the tank was wedded to supporting technologies (i.e., radios), organizational changes (combined arms formations and tactical air support), new operational concepts (air superiority and deep, knife-like thrusts), and command changes (mission-oriented tactics) did the 1940 German blitzkrieg mark an RMA.[5] That means only the technology alone cannot bring a Revolution in Military Affairs. It is the other factors, like organizational changes and operational concepts or strategies along with technology will bring the RMA.

Evolution of Current RMA

According to Andrew Marshall, director of the Office of Net Assessments in the Office of the Secretary of Defense of US, "a Revolution in Military Affairs (RMA) is a major change in the nature of warfare brought about by the innovative application of new technologies which, combined with dramatic changes in military

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