# "Big Fire Control" in the Condition of Information War

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***Abstract* — Due to fast development of information technology, the form of human war is changing from mechanization war to information war. Fire control system should be built from the platform-centric warfare into the network-centric warfare. With the widely use of "big fire control", information war in future will greatly improve overall combat ability. This paper introduces the composition and principle of big fire control and its influence on operation efficiency of weapon system. From characteristics of operation war, the status and function of "big fire control" in future war are analyzed.**

***Key Words- "big fire control" ; information war; network***

## 1. INTRODUCTION

In times of mechanization war, due to the relatively backward information technology and low degree of military information, the information interchange ability between combat units is very limited. Weapon platforms servicing to their own operational requirement mainly rely on its their equipment to collect and process information. Various process of the battle (early warning, sounding, command, control, fire strike) all have their own separate weapon platforms to form a closed loop for the center. The function of information communication among different closed loops is very weak，leading to the low synergy of combat platform. Thus a form of the center of the weapon platform，platform enteric warfare，is presented. It refers to the weapon platform which includes all kinds of weapons, sensors and electronic equipments, such as warships, aircraft, tanks, etc. Taking mobility and fire protection as a whole，the weapon platform is huge volume, complex system and complete function. But it lacks of information communication, resources sharing and cooperation mechanism, limiting the effectiveness of weapon system.

## 2. "BIG FIRE CONTROL" IN THE CONDITION OF INFORMATION WAR

In the late 1990s, information technology has made greatly progress. US army puts forward an idea, namely， network centric warfare. Its essence is to use computer information network to implement integrated command and control the troops or soldiers around. And the core is to use the network to let all combat forces realize information sharing, real-time master of the battlefield situation, shorten the decision time, increase the impact speed and accuracy.So it supports the transfer of "network" from the "platform", forming the coordination of various "big fire control". That is, through the combat unit of battlefield's cooperation in organic network environment, the various sensors of the scattered configuration sense battlefield situation commonly. Using the distribution around network facilities to input, process, storage and share information of battlefield, coordinating the combat operation of combined arms, information advantage is changed into combat advantage.

### *2.1.Composition and Principle of "Big Fire Control"*

Information warfare cannot do without modern means of communication known as the military grid. The so-called military grid is a kind of transmission, processing and sharing military information infrastructure, and it can knit all army resources into a organic whole, enforce all military resources of the interconnection, communication, interoperability, and support integrated joint operations effectively. It consists of various communication satellite, air and sea communication platform, communication station, data transmission link, microwave relay station, terrestrial fiber optical transmission network, wireless radio, TCNT and other communication facilities and various kinds of computer, memory, database, command automation system, geography information system, GPS system of information facilities. There is the ability of transmission, processing, storage and management of the entire range of all kinds of intelligence information battlefield, command information, and collaborate information and security information. The composition of the military grid naturally forms the "big fire control" frame, and it includes three intertwined network: sensor network, warring network and information network. System block diagram is shown in Figure 1 :

Command and control center and communication system together make up information processing and transmission platform, which is a kind of information network. Sensor network and engaging network themselves both join up the sensor, command and control center and weapon platform through the data chain, which is also a kind of network information. Just more emphasis on the roles of the sensor and shooting weapon. The three components of more powerful information network ("big fire control") make combat units link closed and realizing information exchanging, information sharing, close coordination, fast reaction and accurate strike. Combat forces use comprehensive combat sensor system and multi-tools to percept and collect all kinds of battlefield information. After interpretation, analysis and synthesis of information, it can formulate battlefield control plan, using all sorts of communication orders and implement control of battlefield. Through feedback and supervision of communication and information, we can judge and evaluate battle plan according to the troops moving goal, which is to control forces and weapon system to strike

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precisely enemy target. Thus, “big fire control” system embodies information war reconnaissance means diversification, real-time operational command, precision fire strike, combat force integration. Through the process of information collection, handling, transfer and utilization, the troops can real-time sense battlefield situation, make decision of the whole process quickly, target and effect coordination forces strike precisely, so as to realize the “sensor-command and control-shooting weapon” integrate operational process of combat.

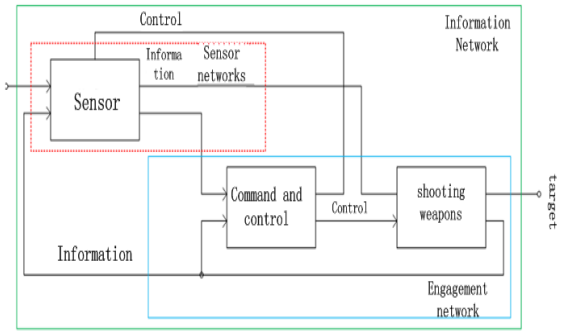


Figure 1. Schematic diagram of fire control system

### 2.2. Sensor Network

Senor network components of all sensors in satellite, aircraft, ships and on the ground and its operating software. It collects data from these scattered sensors and generates battlefield sensory information rapidly. Its role is to “see”, ensure that it gets battlefield perception advantage, strive to obtain maximum battlefield information, master battlefield situation and realize the “one-way transparent”. The basis of the Sensor network is the interconnection of the sensor. Investigation and surveillance capability of a single sensor is limited, only in a certain region within a certain time can conduct investigation surveillance. combined with each sensor and established the comprehensive, full spectrum, full-time reconnaissance and surveillance warning system, that can compensate for the lack of capacity of single sensor surveillance, implying the real-time detection to enemy.

### 2.3. Information Network

Information network composes of communication network and computer system. It takes sensor network and battle network close together, providing the required information transmission ability and computing power. To ensure high speed and safty transmission of information, information network tries its best to provide the largest connectivity. The so-called biggest connectivity is that all sensors, command and control system and weapon system can connect to information network through information transmission system. Information transmission system includes land-based, Heikki, air-based, space-based information transmission system. The information transmission system uses wired or wireless technology to transmit information safety and reliablely with high speed, large capacity and low loss.

### 2.4. Warring Network

Warring network composes of various air-based, land-based and sea-based weapon system and software used to command and control these weapon system. Its mission is to use battlefield sensory information to achieve some fighting effect effectively. The integration of combat power through making combat unit link into an organic whole, which makes battle style undergoing profound changes. In the future information warfare, although a variety of combat forces in space is more dispersed, it can realize more tightly connected together operational requirement through warring network. Whether armored shock troops or dispersion in hundreds of kilometers and even thousands of kilometers around vast ocean of large submarine group; Whether the flying aircraft or the carrying out special task teams on the ground,they all make every combat unit both on the campaign and close together. Warring network makes various operational units coordinate highly. The various operational units of warring network on the multidimensional battlefield, not only grasp close related local battlefield situation but also understand global information of battlefield in real time. At the same time, according to the real-time battlefield changes, it makes combat judgment, decision-making action , realizing real-time and active mutual cooperation, so as to achieve the “1+1>2” effect.

## 3. “Big Fire Control” Effect on Operational Effectiveness of Weapon System

The“Big fire control” is important for future information warfare support. It is based on the cooperative fire control to further development. The main technical characteristics is time-sensitive striking, conprehensive utilization of the sea, land, air. sky, diving multi-dimensional information and intelligent task planning and decision. So the “big fire control” has a direct impact on operational effectiveness of its weapon system.

### 3.1. Improve Fighting Capacity Greatly

Single point of view from the target resource sharing, “big fire control” is equivalent to that each warring unit which has many target detection sensors. That is , as long as the target is found by any unit or platform in the combat group, the blow platform within blow scope can “see” and attack it. For any target, having more than one platform from different directions to the detection will help to inhibit target to cast interference and stable tracking. In addition, a variety of detection equipment sense goal from different directions and obtained data through real-time process, not only can form better image but also supply clear combat airspace through collective power; The original data that detection equipment of some units detect a target from different direction provide fuse. Obtained target designation precision will get increased significantly. Therefore, it is the big fire control can be achieved that the rapid accurately track tactical aircraft or missiles in interference environment in conflict; Relying on accuracy

of the big fire control, warship can take down the supersonic sea-skimming goal beyond the horizon or inside. And precision of the big fire control realizes stability of target repagination and accurate tracking, which improve the speed of command. At the same time, as far as hit effect of target, operational effectiveness of a variety of weapon used cooperatively is effectively ascension

### *3.2. Greatly Improve Resource Utilization*

In the big fire control environment, the function of each combat can be very single. Since target resource sharing, precision striking don't need to equip "clairvoyant" for each platform.

### *3.3. Improve the Viability of the Entire System*

In theory, if a combat unit there is no electromagnetic radiation, only a silent network monitoring system, it is difficul to be found by the enemy. At the same time, it has ability of fast reaction to time-sensitive target greatly, reducing time from finding target to hitting target. So before the enemy attacks,it saves own conditions.

### *3.4. Improve the Reliability and Maintainability of System*

Compared with single fire control, each combat unit of big fire control has simple structure, single function and refining system. To improve the reliability and maintianability of system provides a strong support, so as to increase emission frequency of weapon and the whole weapon system performance.

## 4. "BIG FIRE CONTROL" IS AN INEVITABLE DEVELOPMENT OF FUTURE INFORMATION WARFARE

Along with rolling waves of new changes, information war is speeding up theater of human war. The so-called information war, briefly said is the widespread use of information technology and its physical and chemical weapons epuipment,seise information superiority through war to victory and the right information. Compared with previous war, especially mechanized war, the form of war with hanging over the information aura appear many new and unique characteristics. It is based on this, with "network centric warfare" making important progress on operational notion, big fire control bound to become the core or hub in future information war.

### *4.1 Characteristics of Information War*

4.1.1 Main Battle Weapon--Information Support .Information war as a new form of war, informationized weaponry reflects its combat skills and technology content. The information weapon is mainly composed with information ammunition and the platform of information operations. Information ammunition mainly refers to all kinds of precision weapons, and information operations platform mainly refers to the use of information technology.The control of battle platform guidance function such as strike, precision and integration form automation level of all kinds of weapons and equipment system.This system mainly includes: space in various reconnaissance, warning, communication satellite.The air combat all kinds of advanced fighter, the bomber, airborne warning aircraft, etc. Naval warfare on the field of the all kinds of high technology battleship, on the submarine and ground of all sorts of advanced tanks, armored vehicles, etc.

4.1.2 Battlefield Energy——Release-Information-led.Information war as a senior development stage of mechanization war, the release of battlefield energy is not only the mechanical energy,more important information energy that reflect people's intelligence activities. That is all sorts of information weapon equipment's battlefield detection warning, intelligence, precision, command and control and communication soft skills and so on. The new battlegyoud energy domination and dominated all combat activities on the information battlefield with huge role in winning war.

4.1.3 Main Battle Target——"Three System".Information war, as a new form of war, changes land unit battlefield, the single arms and single battle field of mechanized war in the way of battlefield contesting. Relying on information battlefield, information war is the whole battle of operational system which composition of battlefield awareness system, communication system, command and control system, the combat system(troops,fire) and support security system. Among which, the battlefield awareness system,communication system and command and control system is composed of the "eye", "ear", "nerve" and "brain" of information battlefield, leading and dominating all power and striking of battlefield. Therefore, around the three system of damage enemy and protect own side, the overall contest from system to system will become the key to win in warning parties battlefield.

4.1.4 Main Battle Form——Information Attack.Aa a new operational form, compared with previou form of combat, information warfare has three major differences: One is the key points of confrontation. Information warfare in the hostility information field of fight activity is a decision and command combat. The second is operational target. Information warfare takes damaging and destroying energy's battlefield——"the three system" as major method.The last one is purpose of operation. Information warfare is based on seize battlefield information superiority for the popuse, instead of seizing the battlefield the number of troops and weapons advantage.

4.1.5 The Battlefield Contention Focus——Information Dominance.The information dominance is the key for the information battlefield. It has lead and dominate the initiative in the fight, such as airpower, terrestrial power system, sea power, command and space power and so on. The single fighting for three right of mechanization characteritics has been fully integrated into information dominance's fighting.

### *4.2. Application of "Big Fire Control"*

Fire control system of the 1980s, from scratch, from small to large, from simple to complex and always in the

center of sensor and weapon, continue to develop and gradually improve weapon system. Our country' s fire control system has gone through two generations. The first generation has completed the radar optical fire control system, taking centimeter wave radar, optics, command analyzer and microwave technology analog circuits, analog computer and small and medium-sized digital computer as the main calculating method. The second generation has already achieved radar optical fire control system, including centimeter wave radar, optical tracker, fire control equipment and microwave technology, photovoltaic technology, computer technology. Now we are moving towards construction and development of third-generation fire control system, which fire control equipment and sensor integrated in part of ships and aircraft form a true sense of integrated fire control system. Its main course of development is shown in figure2.

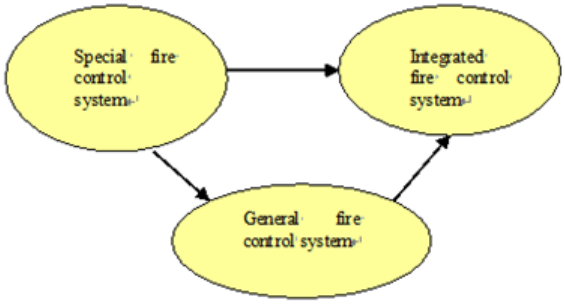


Figure 2 Schematic diagram of its sketch of history

From the 1990s to the beginning of this century, the U.S. forces led a new revolution in military affairs in the world, winning four high-tech local wars with the characteristics of information warfare, making the form of war approaching from mechanization to information technology, completing the internal network building, interoperability of intelligence collection and firing weapons . Firstly, in intelligence-gathering systems to establish the integration of sky, land and sea, they have formed a strategic, operational and tactical multi-level three-dimensional network, commander cognitive battlefield capability and efficiency of command operations has a substantial increase, at all times to know the location of the two sides ofand actions. Secondly, flexible command and control systems makes U.S. combat sensitive reaction and mobilize troops quickly. Thirdly, at present more than half of the equipment of the land, sea and air in each service in the battlefield constitute the interconnected network environment. Typical applications are shown in Figure 3. In four wars, the U.S. military validated the initial results of a new revolution in military affairs, fast conversion and continuous innovation, which accelerate the process of building of military information.

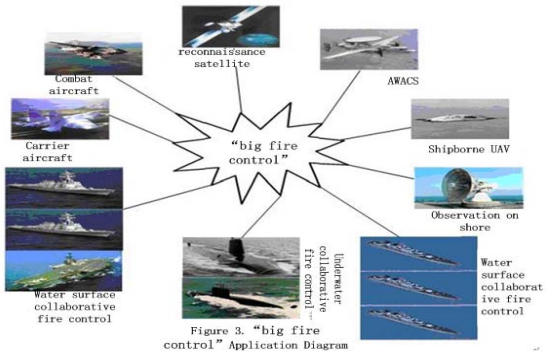


Figure 3. "big fire control" Application Diagram

Various countries are developing their own unique characteristics of the fire control system at present. With the changes in modern warfare, the idea of the big fire control is gradually used in a variety of weapon systems.Due to the limitations of the economic and technological level,our army's information construction started late.While committed to weapons and equipment information, we are trying to build a safe, smooth and efficient big fire control. Such as in the previous live ammunition drill, the availability of intire information system is regarded as a basic principle. Concerning about missile, back-to-back training ideas, not the default targets, not reported in advance target position, formulating a provisional target reflexively to defer to the land, sea and air potential three-dimensional attack, all these has proved to be the basic method of the drill. From the point of the effect of drill, it has reached the expected purpose. In the future, regardless of the ships, aircraft, or chariot, fire control systems will become more established its control center position.

## 5. THE COMPLIMENTARY CLOSE

With the evolution of fire control system, it will be developed as "realizing grids, improving automation, integration expansion and creating intelligent". At present, we should consciously establish the concept of fire control systems, establish a more open fire control system, make the fire control system into a large system, seize opportunities, meet challenges, improve the intrinsic quality solidly, set long-term goal, catch up and exceed tactical and technical level of the fire control system of the military power world as soon as possible.

## REFERENCES

[1] Wang Haichuan, the status of the ships fire control system and development vision [J] Command, Control and Simulation, 2007 (1)

[2] Wang Baocun , to save the king, that the information construction of foreign troops in Theory and Practice [M] PLA Publishing House, 2008

[3] Liu Peng, Wang Lihua, to the era of military grid [M] People's Liberation Army Press, 2004

[4] Song Siping, Zhao Jianchuan, Application and Development of Cooperative Engagement Capability navigation and radar dynamics [J], 2001 (6)