



**The United States Army  
Concept Capability Plan  
for**

**Army Electronic  
Warfare Operations**

**for the  
Future Modular Force**

**2015-2024**

**Version 1.0**

**16 August 2007**



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## Foreword


*From the Director  
U.S. Army Capabilities Integration Center*

Evolving joint and Army concepts indicate that the future Modular Force will operate as part of a joint or multinational force. Future forces will operate across the spectrum of conflict on a global battlefield involving simultaneous regionally focused operations. These operations will take place in an increasingly complex electromagnetic environment, where both technical military capabilities and commercial off the shelf technology are being used to support military operations at an unprecedented rate. To operate unimpeded in the complex electromagnetic environment, the future Modular Force requires electronic warfare capabilities.

*The U.S. Army Concept Capability Plan for Army Electronic Warfare Operations for the Future Modular Force 2015-2024* outlines electronic warfare (EW) operations. It identifies the EW capabilities required to execute Army operations in a joint environment during the 2015–2024 timeframe. The capabilities identified in the concept capability plan (CCP) provide a coherent means of examining potential doctrine, organization, training, materiel, leadership and education, personnel, and facilities (DOTMLPF) solutions. This CCP will therefore serve as the basis for a comprehensive capabilities based assessment involving many different proponents.

In examining the Army’s future EW requirements and capabilities, the CCP describes the integration of EW capabilities in support of the seven key ideas articulated in the Army’s capstone concept. These EW capabilities when applied across the warfighting functions will provide future Modular Force commanders the capabilities required to address the potential enemy EW threats within the joint operational environment out to 2024. The CCP describes the need for improved EW platforms and systems and how Army forces will leverage joint, Service, interagency, commercial, and multinational capabilities to assist in providing EW support to full spectrum operations. The CCP acknowledges that EW has a substantial joint dimension and therefore draws from the relevant joint concepts.

As with all concepts, CCPs are continuously evolving. This CCP will be refined and updated as new ideas and technologies emerge and as the capabilities introduced in this document are integrated. This CCP has applicability to many joint and Army functional areas and I recommend it to you when engaging other joint organizations, Services, and proponents.

  
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## Executive Summary

### Introduction

a. EW refers to any action involving the use of electromagnetic (EM) or directed energy to control the electromagnetic spectrum (EMS) or to attack the enemy. The purpose of EW is to deny the opponent an actual or perceived advantage in the EMS and ensure friendly unimpeded access to the electromagnetic environment.

b. EW can be applied from air, sea, land, and space by manned and unmanned systems. EW is employed to generate desired effects involving various levels of detection, denial, deception, disruption, degradation, protection, and destruction. (See Joint Publication 3-13.1 for EW effects.).

### Basis of Electronic Warfare

In order to dominate the EMS within the land component commander's area of operations; the Army must develop the capabilities required to exploit the vulnerabilities and opportunities inherent within the electromagnetic environment (EME). The EW subdivisions of *electronic attack* (EA), *electronic protect* (EP) and *electronic warfare support* (ES) will assist commanders in shaping the EME by ensuring friendly advantage, while delivering the capabilities necessary to create threat disadvantage. EW will support Army, as well as joint, interagency and multinational (JIM) operations, by providing capabilities that enable full spectrum operations. These capabilities will require integration across the warfighting functions and must address the broadening set of EW targets and threats.

### The Problem

a. Military operations are executed in an increasingly complex EME. The burgeoning of commercial technology is creating both challenges and opportunities in the use and exploitation of the EMS. State and non-state adversaries are able to access these technologies and adapt them to their needs. Compounding the problem is our adversaries' use of these technologies among legitimate civilian user infrastructures. Within this complex environment, the Army does not possess the requisite EW capabilities required to operate freely across the EMS, while controlling adversarial use of the EMS.

b. Over the last decade, the Army focused its EW efforts on improving its signals intelligence capabilities which has significantly improved intelligence support to EW. There has also been a push to develop and build EA capability (such as, counter remote control improvised explosive device electronic warfare system) by the intelligence community. However, the Army must address the full complement of EW capabilities (EA, EP, ES) in order for land force commanders to dominate the EMS operational environment.

### Solution Synopsis

a. Future Modular Force commanders must integrate EW capabilities in support of the seven key ideas articulated in the Army's capstone concept. These EW capabilities when applied

across the warfighting functions will provide future Modular Force commanders the desired EW capabilities needed to dominate the EMS within their operational environment. These capabilities will be integrated with and will leverage joint capabilities to provide EW support to full spectrum operations during all phases of operations.

b. EW capabilities must be fully integrated with LandWarNet and joint command and control systems to enable information sharing across the global information grid (GIG), and to provide an accurate common operational picture (COP) of EW operations. The listing of required capabilities are the optimum set of EW capabilities and remain the goal of what a future Modular Force requires to operate in a 2024 joint operating environment (JOE).

### **Key Ideas**

a. The combination of EW capabilities applied across the Army's warfighting functions, in support of full spectrum operations, will provide the capabilities necessary to address the broadening set of EW targets and threats to enable land force commanders to dominate the EMS within their area of operations. The integration of EW capabilities across the doctrine, organizations, training, materiel, leadership and education, personnel, and facilities (DOTMLPF) processes, will enable full spectrum dominance through the implementation of unparalleled ES, EA, and EP.

b. This concept capability plan (CCP) draws its key ideas and required capability statements directly from joint and Army concepts. The EW CCP refines these broader capability statements into EW enabled capability statements and provides a more detailed description of the capabilities required by the Future Modular Force of 2015-2024. Although many of these capabilities are yet to be realized, they represent those required to bridge the gap between the current modular force and the future Modular Force.

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Headquarters, United States Army  
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Fort Monroe, Virginia 23651-1046

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Military Operations


**THE U.S. ARMY CONCEPT CAPABILITY PLAN FOR ARMY ELECTRONIC  
WARFARE OPERATIONS FOR THE FUTURE MODULAR FORCE 2015-2024**

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**History.** This publication is a new United States Army Training and Doctrine Command (TRADOC) concept capability plan (CCP) developed as part of the Army Concept Strategy for the future Modular Force and as part of the capabilities-based assessment (CBA) process.

**Summary.** TRADOC Pamphlet (Pam) 525-7-6, *The U.S. Army Concept Capability Plan for Army Electronic Warfare Operations for the Future Modular Force 2015-2024*, is the overarching CCP for what is required to accomplish electronic warfare (EW) operations in the future Modular Force. It focuses on the strategic, operational, and tactical application of integrated EW capabilities, across the range of military operations. The ideas presented are fully integrated within the evolving context of the future operating environment, joint and Army strategic guidance, and the Army Concept Strategy.

**Applicability.** This pamphlet applies to all Department of Defense (DOD), Department of the Army (DA), and TRADOC Services, agencies, and activities. It functions as the basis for developing required solution sets related to the future Modular Force EW operations within the domains of doctrine, organizations, training, materiel, leadership and education, personnel, and facilities (DOTMLPF) requirements.

**Proponent and supplementation authority.** The proponent of this pamphlet is the TRADOC Headquarters, Director, Army Capabilities Integration Center (ARCIC). The proponent has the authority to approve exceptions or waivers to this pamphlet that are consistent with controlling law and regulations. Do not supplement this pamphlet without prior approval from Director, TRADOC ARCIC (ATFC-ED), 33 Ingalls Road, Fort Monroe, VA 23651-1061.

**Suggested improvements.** Users are invited to send comments and suggested improvements on DA Form 2028 (Recommended Changes to Publications and Blank Forms) directly to Commander, TRADOC (ATFC-ED), 33 Ingalls Road, Fort Monroe, VA 23651-1046. Suggested improvements may also be submitted using DA Form 1045 (Army Ideas for Excellence Program Proposal).

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## Chapter 1 Introduction

### 1-1. Purpose

a. The purpose of this concept capability plan (CCP) is to identify future required electronic warfare (EW) capabilities for the future Modular Force for the 2015-2024 time period based on a detailed analysis of joint and Army concepts. The identification of these capabilities will provide a coherent way ahead for the further examination of potential doctrine, organizations, training, materiel, leader development and education, personnel, and facilities (DOTMLPF) solutions. These potential solutions will enable joint and Army operations at all echelons across the spectrum of conflict. Army EW operations are not the exclusive domain of any single branch or functional proponent. The ability to dominate the electromagnetic spectrum (EMS) within the land force commander's operational environment (OE) is central to achieving the full spectrum dominance envisioned in the joint and Army concepts.

b. This CCP provides for the integration of Army EW operations for the future Modular Force and may result in an Army EW focused capabilities-based assessment (CBA) involving many different proponents. This CCP presents capabilities envisioned to be used by a wide range of organizations that enable the effective application of EW capabilities in a joint, interagency, and multinational (JIM) environment. It describes how Army forces will integrate the lethal and nonlethal capabilities of EW assets.

c. This CCP discusses the application of existing and emerging joint and Army intellectual ideas on EW and identifies capabilities required for the use of the EW in support of future Modular Force operations. The Army EW operations CBA will identify DOTMLPF solutions or solution sets for Army EW operations capability gaps during the 2015–2024 timeframe. Experiments, tests and studies are needed to mitigate the risk inherent in developing and fielding these advanced capabilities.

### 1-2. Functional Area

a. This EW CCP identifies capabilities required to execute EW in support of the joint and Army concepts during the 2015-2024 timeframe. This CCP reaches across the fires, intelligence, protection, movement and maneuver, command and control (C2), and sustainment warfighting functions. In addition, this concept is fully nested with the Army concept strategy documents, from the Army capstone concept, TRADOC Pamphlet 525-3-0, *The Army in Joint Operations*, to the two operating concepts, *Operational Maneuver*, and *Tactical Maneuver*, and the six Army functional concepts, *Battle Command*, *See*, *Strike*, *Sustain*, *Move*, and *Protect*.

#### b. Overview of EW

(1) Military operations are taking place in an increasingly complicated information environment, where the use of electromagnetic (EM) devices are increasingly used alone and in networks by both civilian and military organizations and individuals for intelligence, communications, navigation, sensing, information storage, and processing, as well as a variety of

other purposes. These EM systems and devices operate across a spectrum that is divided into bands ranging from radio frequencies at the low end to x-ray and gamma frequencies at the high end, known as the EMS. The recognized need for military forces to have unimpeded access to and use of the EMS creates vulnerabilities and opportunities for EW in support of military operations. EW includes three major subdivisions (see fig 1-1): electronic attack (EA), electronic protection (EP), and ES. (See Joint Publication 3-13.1 for EW.)

(2) EA involves the use of EM energy, directed energy (DE), or anti-radiation weapons to attack personnel, facilities, or equipment with the intent of degrading, neutralizing, or destroying enemy combat capability and is considered a form of fires.

(3) EP involves actions taken to protect personnel, facilities, and equipment from any effects of friendly or enemy use of the EMS that degrade, neutralize, or destroy friendly combat capability.

(4) ES is the subdivision of EW involving actions tasked by, or under direct control of, an operational commander to search for, intercept, identify, and locate or localize sources of intentional and unintentional radiated EM energy for the purpose of immediate threat recognition, targeting, planning, and conduct of future operations.

(5) The purpose of EW is to deny the opponent an advantage in the EMS and ensure friendly unimpeded access to the EMS portion of the information environment. EW can be applied from air, sea, land, and space by manned and unmanned systems. EW is employed to support military operations involving various levels of detection, denial, deception, disruption, degradation, protection, and destruction.

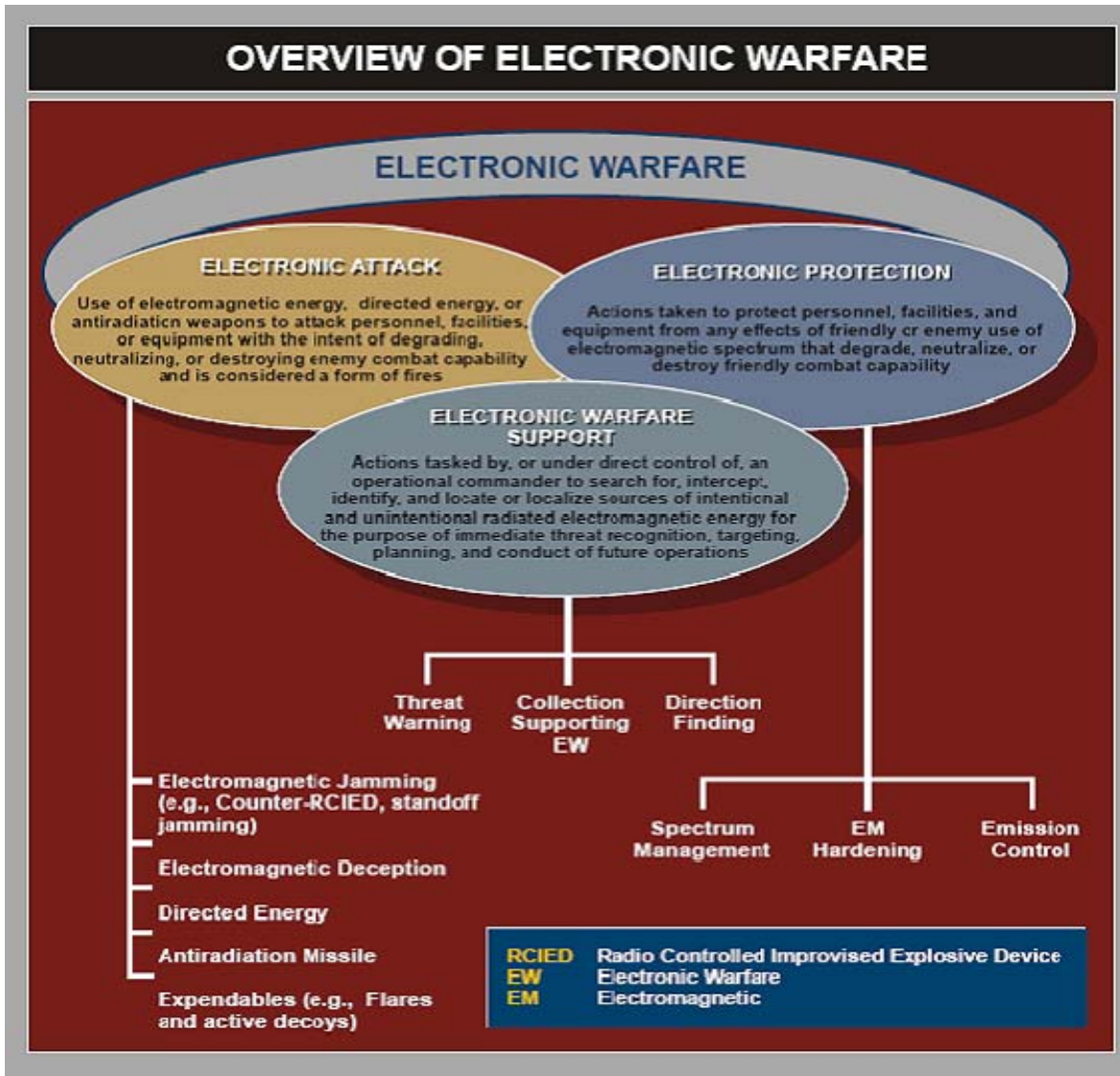


Figure 1-1. Overview of EW

1-3. Scope

a. This CCP focuses on the desired EW capabilities to enable dominance of the EMS within the Army commander’s OE. The underlying concepts in this plan are nested within the Army’s future Modular Force capstone concept and other emerging joint and Army concepts and will form the foundation for all EW (EA, EP, and ES) discussions and analysis across the DOTMLPF domains.

b. Additionally, this EW CCP addresses the conduct of Army EW operations in support of both traditional and nontraditional missions within the context of the warfighting functions (intelligence, movement and maneuver, fires, protection, sustainment, and C2).

#### 1-4. Relation to the Family of Joint and Army Concepts

a. This CCP is vertically integrated with the joint and Army capstone concepts: *Capstone Concept for Joint Operations (CCJO)* and *The Army in Joint Operations, the Army's Future Force Capstone Concept*; the Army's two operating concepts: *Operational Maneuver* and *Tactical Maneuver*; and six Army functional concepts: *Battle Command, See, Move, Strike, Protect, and Sustain*. This CCP also articulates the application of desired EW capabilities across the warfighting functions of: movement and maneuver, intelligence, fires, sustainment, C2, and protection. Additionally, this CCP enables the Army's vision of future capabilities in support of the joint operating concepts (JOCs); joint functional concepts (JFCs); joint integrating concepts (JICs); and U.S. Strategic Command's (USSTRATCOM) Operational Concept for Electronic Warfare (OCEW).

b. CCJO. The CCJO addresses three fundamental actions for employment by the joint force in any campaign; acquire knowledge, extend reach, and create effects. This EW CCP supports the acquire knowledge action through ES enabling capabilities that provide threat warning, direction finding and collection of radiated EME in support of land force operations. The application of current and emerging EA capabilities will provide both lethal and nonlethal fires capable of extending the reach of the force and creating desired effects. Finally, the application of EP capabilities, through both active and passive means, will enable all three actions for employment, by providing the required protection of personnel, facilities and equipment against friendly and enemy EW. This EW CCP seeks to resolve the EW capability gaps that will enable friendly effects on the battlefield against the emerging challenges of catastrophic, irregular, disruptive, and traditional threats identified in the CCJO.

#### c. JOCs

(1) *Major Combat Operations (MCO) JOC*. MCO are large-scale operations conducted against a nation state(s) that possesses significant regional military capability and the will to employ that capability in opposition to or in a manner threatening to the U.S. National security interest. The MCO JOC assumes future regional adversaries will have significant anti-access capabilities and weapons of mass destruction (WMD). The central theme of MCO JOC is to "...achieve decisive conclusions to combat and set the conditions for decisive conclusion of the confrontation; use a joint, interdependent force that swiftly applies overmatching power simultaneously and sequentially, in a set of contiguous and noncontiguous operations; employ joint power at all points of action necessary; and create in the mind of our enemy an asynchronous perception of our actions—all to compel the enemy to accede to our will." The MCO JOC proposes a synergistic blend of diverse National, non-military capabilities with a superior military force. It describes an approach to warfighting that exploits all instruments of national and multinational power to achieve *full spectrum dominance*. EW in support of the MCO JOC will be addressed in chapter 2, within the context of the seven key operational ideas articulated in the Army's future Force Capstone Concept.

(2) *Homeland Security JOC*. The highest priority of the United States (U.S.) security strategy is homeland security. The assignment of DOD homeland defense responsibilities to U.S. Northern Command (NORTHCOM) carried with it the inherent responsibility to establish a credible force structure to meet homeland defense requirements. "U.S. NORTHCOM's mission

is to conduct operations to deter, prevent, and defeat threats and aggression aimed at the U.S., its territories, and interests within the assigned area of responsibility (AOR) and as directed by the President or Secretary of Defense, provide military assistance to civil authorities...” The “homeland” is physical region that includes the 50 states, U.S. territories and possessions in the Caribbean Sea and Pacific Ocean, and the immediate surrounding sovereign waters and airspace. EW applications can help detect, deter, prevent, and defeat external aggression and provide early warning for threats such as: ballistic missile threats; airborne threats; maritime threats; land threats; and hostile space and cyber systems. EW also provides nonlethal options for employment or use when operating in the homeland or its associated environs. However, the use of EW applications for homeland security also poses unique challenges with regard to U.S. law, which may limit available EW options. (See USSTATCOM, *Operational Concept for Electronic Warfare* for more information about challenges and limits.)

(3) *Military Support to Stabilization, Security, Transition, and Reconstruction Operations JOC*. The operations as described in the stabilization, security, transition, and reconstruction operations JOC are multiagency operations that involve all instruments of national and multinational action, including the international humanitarian and reconstruction community to support major conventional combat operations if necessary; establish security; facilitate reconciliation among local or regional adversaries; establish the political, social, and economic architecture; and facilitate the transition to legitimate local governance. The objective is to establish a local government capable of providing for its own security, rule of law, social services, and economic activity. During stability operations (in post conflict (Phase IV+)), Army EW capabilities can foster restorative operations by offering nonlethal force options, signals monitoring of subversive elements, or assist in the broadcasting of civil affairs and psychological operations (PSYOP) influence messages to assist interim authorities. These options, in a restive post hostilities environment, may nurture the conditions from which stability can grow. Consequently, nonlethal force protection, as well as covert or clandestine ES capabilities is the most valued. If aggressive action is necessary, man or vehicle portable systems capable of isolating the battlespace can offer the precious time necessary to prevent a surgical strike from developing into a running mob-induced gun battle.

(4) *Deterrence Operations JOC*. Deterrence operations are used to convince adversaries not to take actions that threaten U.S. vital interests by means of decisive influence over their decisionmaking. Decisive influence is achieved by credibly threatening to deny benefits and or impose costs, while encouraging restraint by convincing the adversary that restraint will result in an acceptable outcome. Deterrence operations provide a set of steps necessary to operationalize deterrence planning that supports the National Military Strategy objective of 'prevent conflict and surprise attacks' and the National Military Strategy requirement to develop a wider range of options that discourage aggression and coercion. The *Deterrence Operations JOC* describes the near and mid-term security environments as being marked by certain characteristics which will have profound implications for U.S. deterrence strategy and operations, including: the wide array of potential adversaries; an asymmetry of stakes versus asymmetry of power; the vulnerability of U.S. society and forces; and some unique characteristics of non-state actors. In discussing the asymmetry of stakes versus asymmetry of power characteristics, the JOC states that, “...the challenge for deterrence operations is finding ways of overcoming potential imbalances of stakes versus power that bolster the credibility of U.S. capabilities. Military capabilities that limit the

damage an adversary can do to U.S. and allied forces and populations (for example, integrated missile defense and consequence management activities) or limit collateral damage from U.S. and allied strikes can increase the credibility of U.S. attack and counter the asymmetry of stakes.” EW capabilities in support of deterrence operations can be used to limit collateral damage, while severing lines of communication (LOC), logistics, C2, and other key adversary functions. Technological advances in EW (such as DE weapons) will also enhance deterrence operations by providing capabilities that will affect how an adversary perceives the potential benefits and costs of actions we seek to deter.

d. JFCs

(1) *Battlespace Awareness JFC*. According to the *Battlespace Awareness JFC*, battlespace awareness in 2015 provides *actionable intelligence* to commanders and warfighters, and provides them with the ability to make better decisions faster by enabling a more thorough understanding of the environment in which they operate. Army ES capabilities will enhance battlespace awareness by supporting the warfighter in the collection, interception, identification, and locations of radiated EME; threat warning; direction finding; and can also assist in monitoring and securing LOC. Additionally, EP capabilities can protect friendly information, information systems, sensors and communications services from the effects of friendly or enemy EW through EM hardening, spectrum management, and emission control (EMCON) measures.

(2) *C2 JFC*. As stated in the *C2 JFC*, C2 is the ability to recognize what needs to be done in a situation and to ensure that effective actions are taken. In 2015, U.S. commanders will habitually be operating in a joint and multilateral environment as part of joint and/or combined operations...the ability for all these players to collaborate with one another will be instrumental in the success or failure of these operations. A major focus of this EW CCP is to enable integrated/interoperable EW capabilities, which will use and can be shared through a common C2 architecture in support of Army operations. Additionally, this EW CCP will enable the EP of this common C2 architecture against the effects of friendly and enemy EW.

(3) *Force Application JFC*. In its simplest form, force application can be described as the maneuver and engagement of combat forces to generate the effects desired on the enemy. This EW CCP supports the *Force Application JFC* through the application of EW to produce effects designed to control, deny, deceive, disrupt, degrade, and or destroy adversary personnel, equipment and facilities and EW capabilities. Forces must possess combinations of stealth, speed, information superiority, connectivity, protection, and lethality to enable maneuver. This EW CCP will enable maneuver by providing support to information superiority, connectivity, protection and lethality through the application of Army EA (lethal and nonlethal), EP and ES capabilities in support of land force operations.

(4) *Net Centric JFC*. This EW CCP views net-centricity as a fundamental aspect of future EW operations. The networking of all joint force elements creates capabilities for unparalleled information sharing and collaboration and a greater unity of effort via synchronization and integration of force elements at the lowest levels. It also provides a foundation across the full spectrum of joint operations for providing the ability to electronically share sensor data among multiple sensors in order to increase capability over that provided by



any single sensor. EW supports the *Net-Centric JFC* through the application of EP capabilities to protect friendly information, information systems, sensors and communications services from the effects of friendly or enemy EW, and can assist in the synchronization and integration by providing EW frequency deconfliction and rapid reprogramming of EW systems. Linking 'net ready' EW systems that automatically populate the COP with operational information (with little human intervention) will also support the *Net Centric JFC*.

(5) *Protection JFC*. Protection is composed of a variety of active and passive measures (such as, weapons, pre-emption, and warning) in the air, land, sea, and space domains. Protection must be proactive, focused, and conducted by integrating military and cross government capabilities against our adversaries. The joint force will achieve this through the scaled and tailored selection and application of multilayered, active and passive, lethal and nonlethal measures, within the air, land, sea, and space, across the range of military operations (ROMO), based on assessment of an acceptable level of risk. The goal is to prevent adversaries from employing capabilities that would restrict or prevent the joint force from conducting decisive actions at a time and place of our choosing. EW supports the *Protection JFC* through the employment of both active and passive capabilities (lethal and nonlethal) that deny adversarial actions aimed at preventing friendly decisive actions.

e. Relevant JICs

(1) *Global Strike JIC*. Global strike is defined as responsive joint operations that strike enemy high value and high payoff targets, as an integral part of joint force operations conducted to gain and maintain battlespace access, achieve other desired effects and set conditions for follow-on decisive operations to achieve strategic and operational objectives. EW will support the *Global Strike JIC* through the application of ES (strategic, operational, and tactical) capabilities to assist in the collection, interception, identification, and location of radiated EM energy to enable global strike operations against high value and high payoff targets. Additionally, EA capabilities can be used to produce lethal or nonlethal effects against the targets once identified and located.

(2) *Integrated Air and Missile Defense (AMD) JIC*. This EW CCP supports the *Integrated AMD JIC*'s position for the integration of joint AMD capabilities. Integrated joint and Army AMD capabilities are required to ensure protection of the force. EW support to this JIC is provided through the application of EP capabilities to protect friendly AMD personnel, equipment and facilities from the effects of EW (both friendly and enemy) through EM hardening, spectrum management and EMCON measures. Additionally, ES can provide detection, location and tracking of adversary platforms radiating in the EME and EA capabilities can be used to support active air defense missions by denying, disrupting or destroying adversary systems and platforms.

(3) *C2 JIC*. This EW CCP supports the *C2 JIC* through the application of EP capabilities to protect C2 nodes and systems and equipment from the effects of friendly and adversary EW operations, and to provide EW frequency deconfliction and rapid reprogramming of EW systems. The application of EA and ES capabilities can also be used to preempt or

counter the adversary's use of EW to deny, disrupt, degrade or destroy friendly net-centric C2 functions.

(4) *Persistent Intelligence, Surveillance, and Reconnaissance (ISR): Planning and Direction JIC*. The *Persistent ISR JIC* proposes to improve persistence through integrated, synchronized management in the planning and direction of ISR assets to the benefit of the joint force commander. The enabling capabilities needed for P-ISR include integrated planning and prioritization of information needs; multi-level tasking of ISR assets; and global visibility of information needs and ISR assets. This EW CCP supports the *Persistent ISR JIC* by recognizing that those enabling capabilities apply to EW assets as well. Full integration of EW with ISR efforts will better allow for satisfying the commander's information needs while properly executing offensive and defensive EW operations. Also, as with ISR, multi-level tasking and global visibility of EW assets will ensure effective and efficient use of those limited EW systems and capabilities while ensuring that EW operations do not work at cross-purposes with ISR efforts.

f. The Army's Family of Future Force Concepts

(1) *The Army in Joint Operations, The Army's Future Force Capstone Concept*. This concept defines full spectrum dominance as the defeat of any adversary or control of any situation across the full ROMO, which is the overarching goal of joint transformation and joint force development. This EW CCP supports the seven key operational ideas in the Army capstone. These are shaping and entry operations, operational maneuver from strategic distances, intra-theater operational maneuver, decisive maneuver, concurrent and subsequent operations, distributed support and sustainment, and networked-enabled battle command. These seven key ideas articulate how Army operations enable the joint force commander to seize the initiative early, transition rapidly to decisive operations, sustain operations through multiple campaigns, when required, to achieve strategic objectives, and maintain stability thereafter to "win the peace" over the long term. The future combat force will apply adaptive combinations of these seven key operational ideas across the ROMO. As this CCP supports the joint concept family, it subsequently supports the Army in joint operations and will describe how Army EW capabilities will enable full spectrum operations (FSO) within a JIM environment. EW in support of the seven key operational ideas will be further discussed in chapter 2 within the joint campaign framework.

(2) *The U.S. Army Operating and Functional Concepts*. This CCP supports the key ideas articulated within the Army's two operating concepts; *Operational Maneuver* and *Tactical Maneuver*, and the six Army functional concepts *Battle Command*, *See*, *Move*, *Strike*, *Protect* and *Sustain*. The six warfighting functions are used to describe how EW capabilities are applied in support of operations. A warfighting function is a group of tasks and systems (people, organizations, information, and processes) united by a common purpose that commanders use to accomplish missions and training objectives. Commanders visualize, describe, direct, and lead operations in terms of the warfighting functions. Decisive, shaping, and sustaining operations combine all the warfighting functions to generate combat power. There are six warfighting functions: intelligence, movement and maneuver, fires, protection, sustainment and C2. Each of the warfighting functions can be significantly enhanced by EW capabilities in support of

offensive, defensive and stability or civil support operations, and will be discussed in greater detail in chapter 2.

### **1-5. References**

Required and related publications and prescribed and referenced forms are listed in appendix A.

### **1-6. Explanation of Abbreviations and Terms**

Abbreviations and special terms used in this pamphlet are explained in the glossary.

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## **Chapter 2**

### **EW Concept Capability Plan**

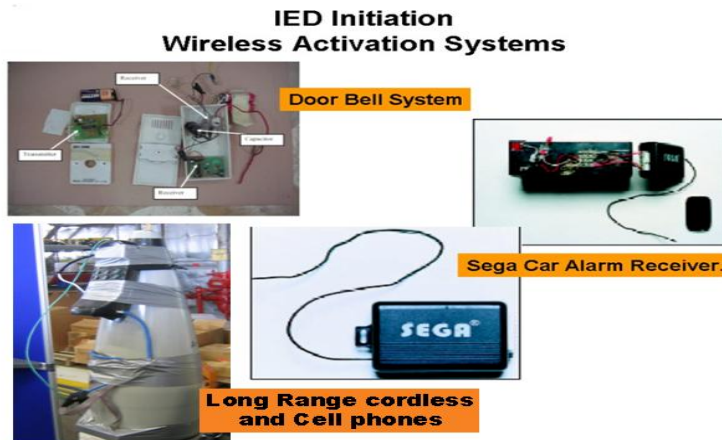
#### **2-1. Introduction**

a. Why this CCP is needed. The complex EME as described in JP 3.13.1 underscores the need for military forces to have unimpeded access to and use of the EMS. Yet there is no current Army concept or plan that takes a holistic view of the Army's EW needs. This CCP accounts for the required joint interdependence of EW capabilities and describes Army EW capabilities required for the future Modular Force. It provides the basis for the systematic, integrated and prioritized development of the EW capabilities required to enable the future Modular Force as it operates in a JIM environment.

b. The execution of military operations is occurring in an increasingly complex EME. Burgeoning commercial technology is creating both challenges and opportunities in the use and exploitation of the broader EMS. The information age, is increasingly punctuated by the emergence of a "wireless world" where all forms of data transmission are taking place via the transmission of EM energy. As a result, the EMS is now an indispensable feature of the modern OE and has contributed to an enormous expansion of the potential EW target set. State and non-state adversaries are able to access these technologies and adapt them to their needs. Compounding the problem is the adversaries' use of these technologies among legitimate civil users. Army forces must have the ability to operate across the EMS while controlling adversarial use of the spectrum and eliminating any inadvertent collateral effects or damage to Army, joint, coalition, and allied systems. Army EW will assist commanders in shaping the OE and will provide them a vast set of protective, lethal and nonlethal options in support of FSO conducted throughout the ROMO.

c. The importance of achieving EMS dominance is evidenced in current efforts to counter the leading cause of troop casualties in Iraq, the improvised explosive device (IED). IEDs are defined as make-shift or "homemade bombs" which are often used to target military convoys. (See terms section for official definition of an IED.) To counter the IED threat in Iraq, DOD chartered a Joint IED Defeat Organization (JIEDDO). JIEDDO efforts are focused on how to counter IED initiators, as they learned that many of the IED initiators (see fig 2-1) were electronic (examples are cell phones, car alarm systems, garage door openers, motion sensors and infrared (IR)) and therefore must operate within the EMS. To counter this electronic type of IED detonation, industry was asked to provide input to mitigate the problem. The recommended

solution was to use an EW system to jam or block the signals of the initiating devices, therefore creating an electronic barrier between the IED and the initiating signal, preventing the detonation. The EW systems eventually developed to counter this threat are called counter radio controlled improvised explosive electronic warfare (CREW) system, which now exist in several forms to detect and prevent IEDs. These systems along with other JIEDDO efforts have contributed to a 45 percent decrease in the rate of IED casualties since April 2004.<sup>1</sup> Although this example is current Modular Force focused, it illustrates the need for future Modular Forces to have the EW capabilities (for example, advanced CREW systems) required to address the growing number of sophisticated threats using the EMS as means to affect future force operations.



**Figure 2-1. Command Detonated IED Initiators**

**2-2. The Problem**

The Army does not currently possess the requisite EW capabilities required to achieve EMS dominance within their OE. Additionally, the Army’s current EW capabilities, although relatively effective against traditional threats, are inadequate to address irregular threats and the explosion of technologies and capabilities that will only increase in the years ahead. In order to address the future challenges to the Army’s ability to dominate the EMS within their OE, the Army must provide the future Modular Force with the EW capabilities required to meet their warfighting needs.

**2-3. OE**

a. The Changing OE

(1) New and emerging technologies will transform the method and manner of warfare. In the next few decades the U.S. will confront unstable, sometimes diverse, and highly uncertain geopolitical alignments that will generate major changes in adversaries’ intent, force array, and strength. There will be increased global and regional interest in local matters that will place increased value in alliances and coalitions. Also, potential adversaries will apply lessons learned based on their study of U.S. methods. New threats may emerge from aspiring great powers, new

<sup>1</sup> Army News Service, *Joint IED Task Force helping defuse insurgency’s threat*, by Rey Guzman, July 18, 2005.

regional alignments, and transnational terrorist or criminal organizations. The global acceleration in communications, sensor networks, and information technologies, together with continuing proliferation of military and commercial technologies, will allow even less wealthy states, and non-state entities, to enhance their ground combat information systems and ISR capabilities to a level once maintained by armies supported by fully industrialized and national economies. (See TRADOC Pam 525-7-4 for space operations).

(2) The physical characteristics of a future theater of war also are likely to prove more challenging. Continuing global urbanization increases the probability that U.S. forces will confront complex topography, even where nature itself does not impose it. Early entry operations, support systems, and facilities will be more vulnerable to direct attack because of the proliferation of hostile communications; sensor, missile, and night vision capabilities; an ever expanding array of precision munitions; special operations forces (SOF), and insurgent or terrorist capabilities, together with a growing threat of WMD. Additionally, most adversaries will become more sophisticated with the adaptive use of camouflage, cover, concealment, denial, and deception (C3D2). Skilled C3D2 will increase ambiguity, obscuring the identity of potential foes and forces. It is relatively cheap, easy to employ, and in most cases effective, which will ensure its proliferation across the OE. Combined with dispersion of forces and other adaptive tactics, C3D2 will affect all forms of intelligence gathering, including space-based assets, making them less effective and harder to employ. Regardless of the adversaries C3D2 efforts, they still must operate within the EMS and are therefore susceptible to being identified and located by their radiated EM energy.

b. The EME

(1) Although nations have used the EMS for military operations for more than 100 years, the full scope and potential for using the EMS as the primary enabler of military operations have not been fully appreciated. The advent of new technologies such as high power microwave (HPM) and DE weapons are part of the EW evolution. A capable enemy can gain an asymmetric advantage through employing information age technology. This threat is compounded by the growth of a wireless world and magnified by the increasing sophistication of commercial off the shelf technologies that are expanding beyond the traditional radio frequency (RF) spectrum. Our adversaries, from single to larger state and non-state adversaries are able to and do use the most modern technology. This modern technology is quickly moving into the cellular and satellite communications area and is blurring lines of today's definitions for EW and computer network operations (CNO). In the not so distant future, this trend toward a wireless world will drive a convergence of the EME environment and the computer network. Due to the magnitude of military and commercial operations that rely upon the EMS and these wireless networks, and the inherent vulnerabilities associated with their use, Army forces must be able to dominate the EMS (within their OE) with the same authority that they dominate traditional land warfare operations.

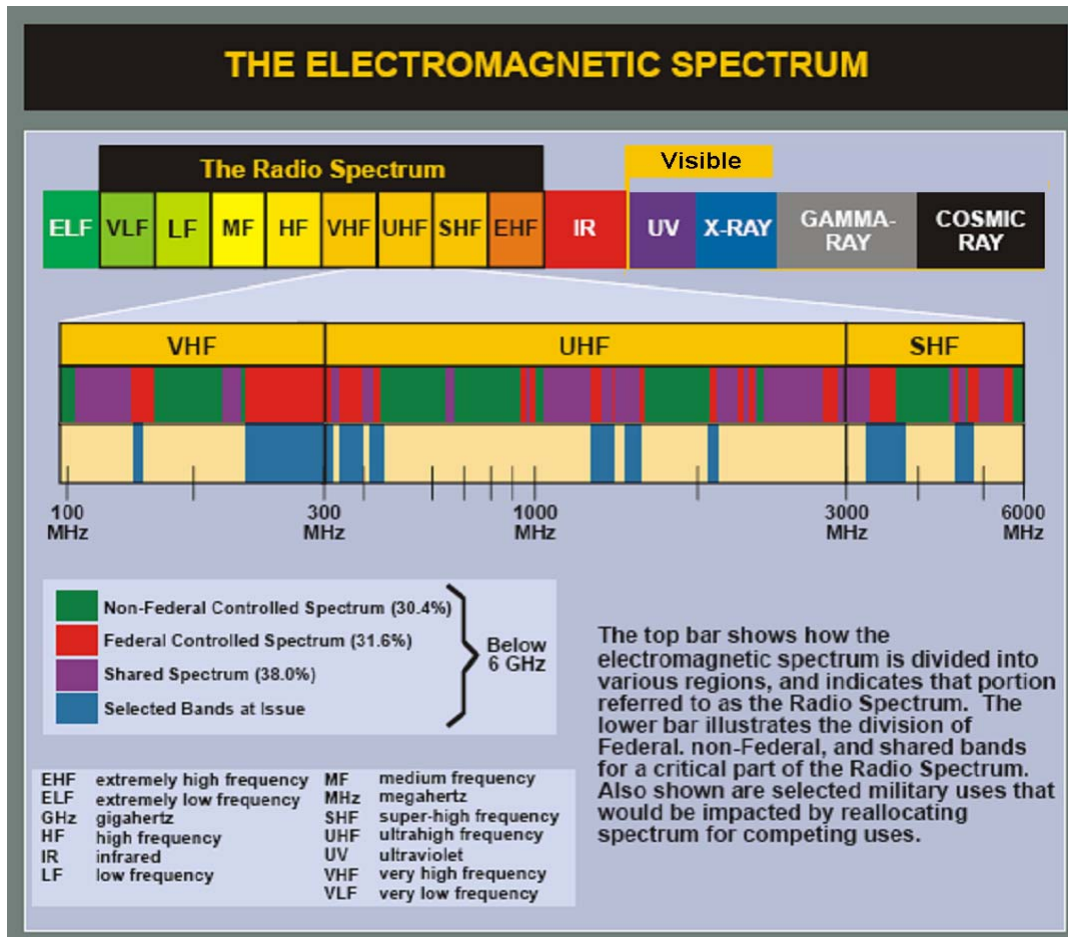


Figure 2-2. The EMS

(2) Use of the EMS has changed significantly in the past 40 years and will continue to change with technological advancements. EW has, and will continue to enable land, sea, air, and space operations through traditional applications such as jamming communications, radar, and position, navigation, and timing systems. However, robust improvements to these capabilities are required to address evolving adversary capabilities. EW capabilities must also expand to enable nontraditional employment in areas like the use of DE against personnel and equipment or detection of autonomous operating weapons through the use of the EMS. In short, the use of EW is growing beyond traditional boundaries as the EMS increasingly becomes a critical element of the operating environment in modern warfare.

(3) As described in the *CCJO*, warfare takes place across the physical, virtual, and human domains. Domain refers to any potential operating “space” through which the target system can be influenced, not only the domains of air, land, sea and space, but also the virtual (information and cyber) and human (cognitive, moral and social) domains. The physical domain includes warfare in air and space, and on land and sea. Within the physical domain, it has only been within the last 100 years that air has become a realistic arena of warfare, and within the last 40 years, space. Technological and conceptual advances gained during the changing geopolitical backdrop of the last 10 years have opened the virtual domain as an

operating environment. The USSTRATCOM OCEW defines the virtual (cyber and information) domain as:

(a) Cyber: The environment in which digitized information is communicated over computer networks.

(b) Information: The environment consisting of information and the means with which it is communicated that traverses all other domains.

c. The Future OE

(1) In future conflict, opponents will attempt to counter U.S. strengths by attacking or exploiting perceived weaknesses, especially our dependence on networked command and ISR, which are so vital to the U.S. system of systems approach to warfare. To accomplish this task they will employ special purpose forces, long-range strike, weapons of mass effects, and information capabilities. Opponents will attack U.S. relationships with host and supporting nations, the media, commercial interests, and multinational or interagency partners. Opponents will attempt to create doubt of the legitimacy of U.S. efforts in overseas operations by aggressively exploiting anti-U.S. sentiments and perceptions. If immediate tactical success is out of reach, adversaries will seek to preserve their military forces, particularly ground forces, while conducting strategic operations to degrade U.S. National will, fracture its alliances and coalitions, and limit the scope of U.S. involvement. The resulting conflicts will be complex, fluid, and lethal. (See TRADOC Pam 525-3-1 for operational maneuver.)

(2) Fundamental capabilities that 21st century adversaries may pursue to counter U.S. strengths include, but are not limited to, WMD delivered by a variety of means; reconnaissance, surveillance, and target acquisition via unmanned aerial systems (UAS); precision strike technology; large caliber rockets; cruise missiles; and electronic and/or information warfare. The adversary may also pursue asymmetrical means such as electromagnetic pulse, particle beam weapons HPM and laser DE weapons to disrupt, deny or destroy mission critical electronic based assets, which U.S. forces are heavily dependent upon. Advances in adversary technology may increase his use of IR, electro-optical (EO), and RF guided missiles. Some countries and non-state entities will rely on asymmetric capabilities as a substitute for, or complement to, large conventional forces. The use of rockets and missiles to attack bases and IEDs to disrupt LOC illustrate this fact.

(3) While no one can exactly predict what actions will or will not be used by a future threat, the following threats should be expected.

(a) Asymmetric approach attacking weaknesses while avoiding strengths.

(b) Well trained forces (individuals and small units).

(c) Effective C2 using a variety of means.

(d) Coordinated combined arms operations, such as, mortars, light infantry, antitank guided missiles, man-portable air defense systems and snipers conducting a well synchronized and sequenced ambush.

(e) Effective ISR, extensive human intelligence and use of unmanned aerial vehicles.

(f) Introduction of leading edge technologies/weapons:

- IED with explosively formed penetrators, sensors, and potentially chemical, biological, and radiological packages.
- Small arms enhancing sniper operations and providing an anti-materiel, armor piercing capability.
- Enhanced indirect fire munitions increasing effectiveness through use of proximity fuses, cluster munitions, and smart munitions.
- Improved antitank guided missiles and rocket propelled grenade munitions, used against a variety of hardened point targets, not exclusively armored vehicles.
- Proliferation of low altitude air defense and surface-to-air missiles. Use of technology and numbers to overwhelm defenses.
- Thermobarics, enhancing the effects of weapons systems.
- Increased use of unmanned aerial vehicles in both an ISR and attack role.
- DE will be developed to target both people and materials. U.S. dependence on electronics and electronic networks can make DE an effective WMD and WME.
- Use of the latest communications devices operating and hidden within civilian infrastructure.

(4) Of the future threats listed above, many either operate within or will be dependent upon the EME to be effective. This creates vulnerabilities and opportunities for EW in support of military operations. Presently, joint and Army EW capabilities do not provide the required effectiveness against these and other emerging threats.

#### **2-4. Joint Interdependence**

a. The synchronized employment of land, air, sea, space, and SOF provides the commander with the widest range of strategic, operational, and tactical options. Joint interdependence is achieved through the deliberate reliance of each Service on the capabilities of others to maximize its own effectiveness while minimizing its vulnerabilities. Key joint interdependencies include: joint battle command; joint force projection; joint air, space and missile defense; joint sustainment; joint fires and effects. The Army's capstone, operational and functional concepts recognize and address each of these dependencies.

b. EW capabilities are made up of high demand low density assets across the services. For this reason, joint interdependence is essential in the conduct of EW operations. This interdependence is complex in that it extends beyond the traditional Service capabilities to include national agencies such as the Central Intelligence Agency, National Security Agency, and Defense Intelligence Agency, who are constantly seeking to identify, catalog, and update the electronic order of battle of identified or potential adversaries. It is therefore critical to leverage



the subject matter expertise, roles and unique capabilities provided by each service, agency and branch or proponent in the conduct of day-to-day operations to integrate all available EW capabilities in support of the joint force commander.

c. Commander, USSTRATCOM is responsible for the Department of Defense (DOD) oversight, planning and execution of information operations (IO) in support of combatant commands and Service component forces. USSTRATCOM has delegated authority to the commander, Joint Information Operations Warfare Command to plan, integrate, and synchronize IO in direct support of joint force commanders' and to serve as the USSTRATCOM lead for enhancing IO across the DOD. As the lead for joint IO, the command is to enable joint force commanders to plan and execute IO, both offensive and defensive involving the integrated use of operations security (OPSEC), PSYOP, military deception (MILDEC), EW, and computer network attack and computer network defense. In support of future EW capabilities development, USSTRATCOM has developed the OCEW. The OCEW sets an objective vision for the development of EW capabilities to achieve EMS dominance, and is applicable to combatant commands, Services, DOD and non-DOD agencies, and the joint staff.

d. In May of 2004, the Defense Acquisition Board was convened for the EW Capability Area Review. After the review, the Under Secretary for Acquisition, Technology and Logistics directed specific actions be taken by the services with respect to EW capability development. Specific recommendations were: the U.S. Navy, Marine Corps and Air Force will develop a joint airborne electronic attack (AEA) system of systems concept of operations (CONOPS) to address employment of AEA assets for all mission areas; that the Army and Marine Corps will take the lead to define AEA missions and capabilities that are needed to support ground operations; and that the Services will also develop sufficiency plans and requirements, and document program and mission relationships. This EW CCP will, in part, help the Army to better define those EW missions and capabilities required to support ground operations.

e. The U.S. Air Force plays a key role in bringing airborne EW capabilities to the ground forces commander. The 8<sup>th</sup> Air Force serves as the only IO and bomber warfighting headquarters, employing global air power for the U.S. Joint Forces Command, USSTRATCOM, and combatant commanders. The 8<sup>th</sup> Air Force commander is also assigned as the Joint Functional Component Commander for global strike integration under USSTRATCOM. The 8<sup>th</sup> Air Force is the first numbered air force to integrate IO into a warfighting headquarters, providing the ability to gain, exploit, and attack adversary information or information systems while defending friendly or coalition information and information systems from enemy attack. In support of EW, the 8<sup>th</sup> Air Force provides the joint warfighter with airborne ISR, signals intelligence (SIGINT), ES, and AEA capabilities.

f. The U.S. Navy also plays a role in bringing the EW capabilities to the warfighter. The Naval Network Warfare Command (NETWARCOM) is the Navy's functional component command to USSTRATCOM and is the Navy's central operational authority for IO. NETWARCOM coordinates and assesses the Navy operational requirements for and use of network C2, information technology, IO, and space. It serves as the operational forces' advocate in the development and fielding of information technology, IO, and space. NETWARCOM's

EW related capabilities which support the joint warfighter include: ISR, ES, AEA, and a cadre of trained and experienced EW personnel.

g. The U.S. Army Space and Missile Defense Command (SMDC)/Army Forces Strategic Command (ARSTRAT) is the Army service component command (ASCC) to USSTRATCOM. SMDC/ARSTRAT is the Army force provider to USSTRATCOM and its joint functional components commands for IO, EW, space, and missile defense related capabilities. SMDC/ARSTRAT conducts IO, EW, space, and missile defense operations and provides planning, integration, control, and coordination of all Army forces and capabilities in support of USSTRATCOM missions. SMDC/ARSTRAT serves as the Army proponent for space and ground based midcourse defense. SMDC/ARSTRAT conducts mission related research, development, and acquisition in support of Army Title 10 responsibilities and serves as the Army focal point for desired characteristics and capabilities in support of USSTRATCOM missions.

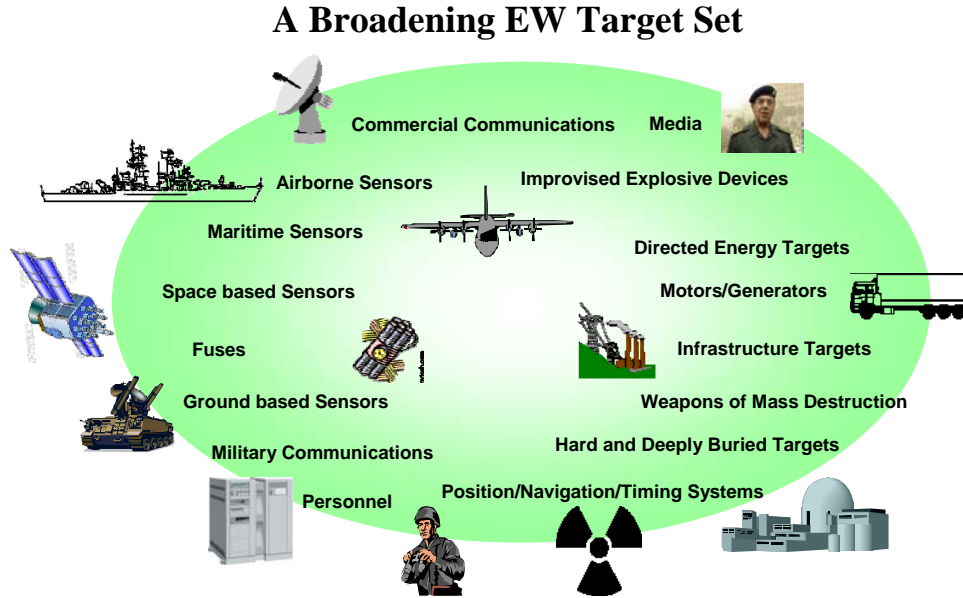
h. In support of the SMDC/ARSTRAT mission, the U.S Army Intelligence and Security Command and its 1st IO Command and 704<sup>th</sup> Military Intelligence Brigade, provide IO support to the Army and other military forces. This support includes intelligence collection and analysis (SIGINT, human intelligence, counterintelligence, imagery intelligence, measurement and signature intelligence, and open source), IO support teams, IO reach-back planning and analysis, and the synchronization and conduct of Army CNO. Additionally, 1<sup>st</sup> IO Command provides Army forces capabilities through leveraging multi-disciplined technical expertise to commanders' staffs and by expediting responsive technical interfaces with other commands.

i. Within the context of joint interdependence, there exists a unique dependency in the Army on fixed wing airborne capabilities. The Army will depend heavily on the joint force for much of their AEA and airborne ES requirements at the strategic and operational levels. Therefore, tactical level manned and unmanned AEA and ES systems within the Army must be interoperable with these joint systems. As Army EW capabilities are developed, the Army will require sufficient numbers of personnel with the right skills to operate and integrate these capabilities into joint and Army operations. The skill sets and organizational structure needed to provide this required capability is the subject of an ongoing analysis being conducted by the EW proponent under the oversight of the Army G3.

## **2-5. The Plan**

a. This EW CCP sets an objective vision for the development of Army EW capabilities to achieve EMS dominance within the land component commander's OE. The ultimate goal is EMS dominance achieved through the application of unparalleled ES, EP, and EA capabilities integrated with physical attack and IO capabilities. EW capabilities can be applied to a growing number of targets across the full ROMO. It is imperative that as the breadth and scope of potential EW targets and requirements increase, that the Army be capable of exploiting the EMS to effectively deal with the multitude of expanding and constantly evolving requirements of the joint force. Fig 2-3 depicts a broadening set of potential EW targets. The potential target categories for traditional and nontraditional RF EA systems include but are not limited to: radar receivers, commercial and military communications devices, position, navigation, and timing transmitters/receivers, and electro-optic/IR sensors. The introduction of HPM EA capabilities

and nonlethal DE systems (RF and laser) will also enable future Modular Forces to directly target the electronic circuits that are fundamental to most military systems. Additionally the capability to conduct precision EW collection and attack operations will broaden the target set even further.



**Figure 2-3. A Broadening EW Target Set**

b. In order to realize the vision of full spectrum dominance envisioned in the MCO JOC, the Army must expand its EW capabilities to control, detect, locate, attack, or defend against the full spectrum of EW threats across the ROMO, by providing the future Modular Force warfighters with the tools required to dominate the EMS within their OE. While the future Modular Force will be able to take full advantage of capabilities available through joint interdependency, the Army must also be able to dominate the EMS within the area of operation (AO). EMS dominance is defined as, “the ability to defeat or control any adversary’s use of the EMS while ensuring friendly ability to use the EMS unencumbered for our own purposes.” In the context of this CCP, required EW capabilities will be described as systems, applications or processes applied across the warfighting functions. These capabilities will extend advantages or enable the successful accomplishment of the seven key ideas articulated in the Army’s capstone concept.

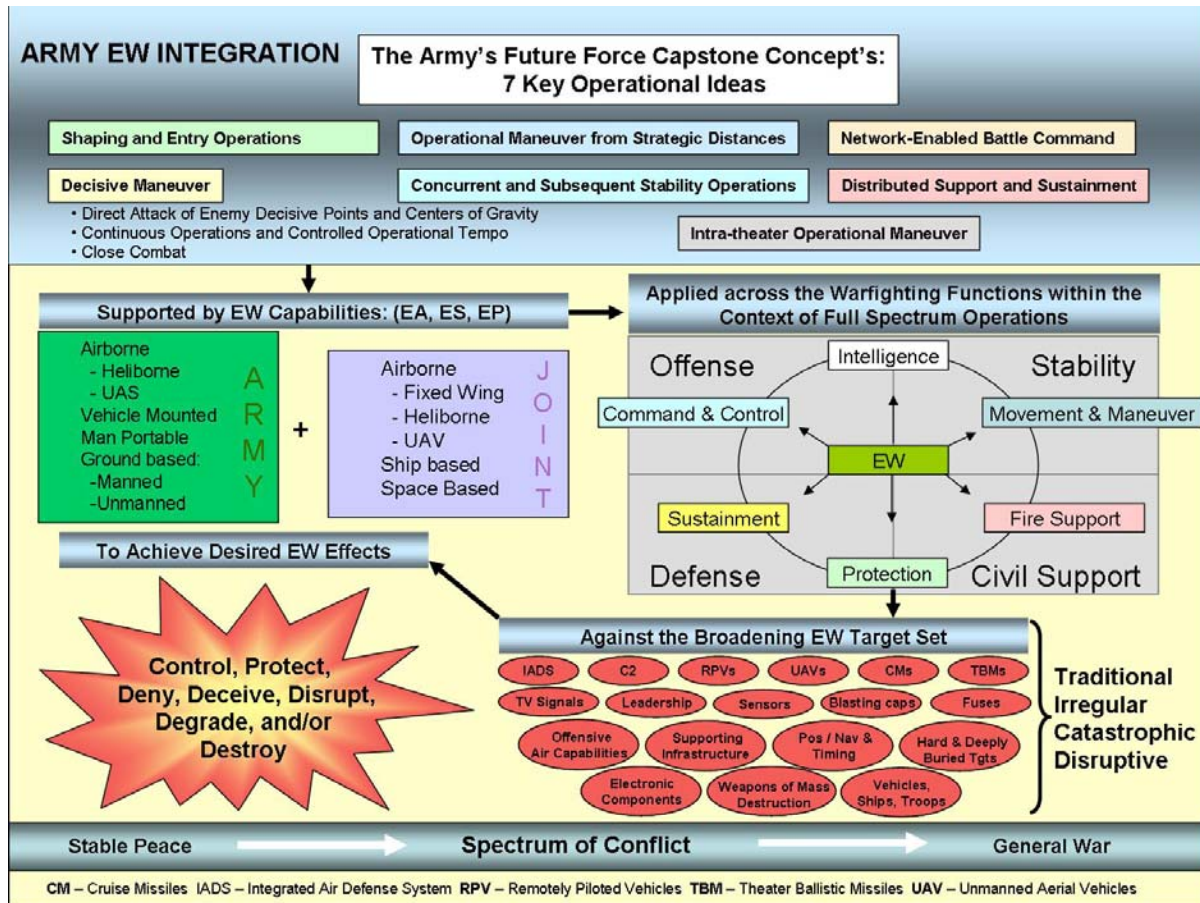
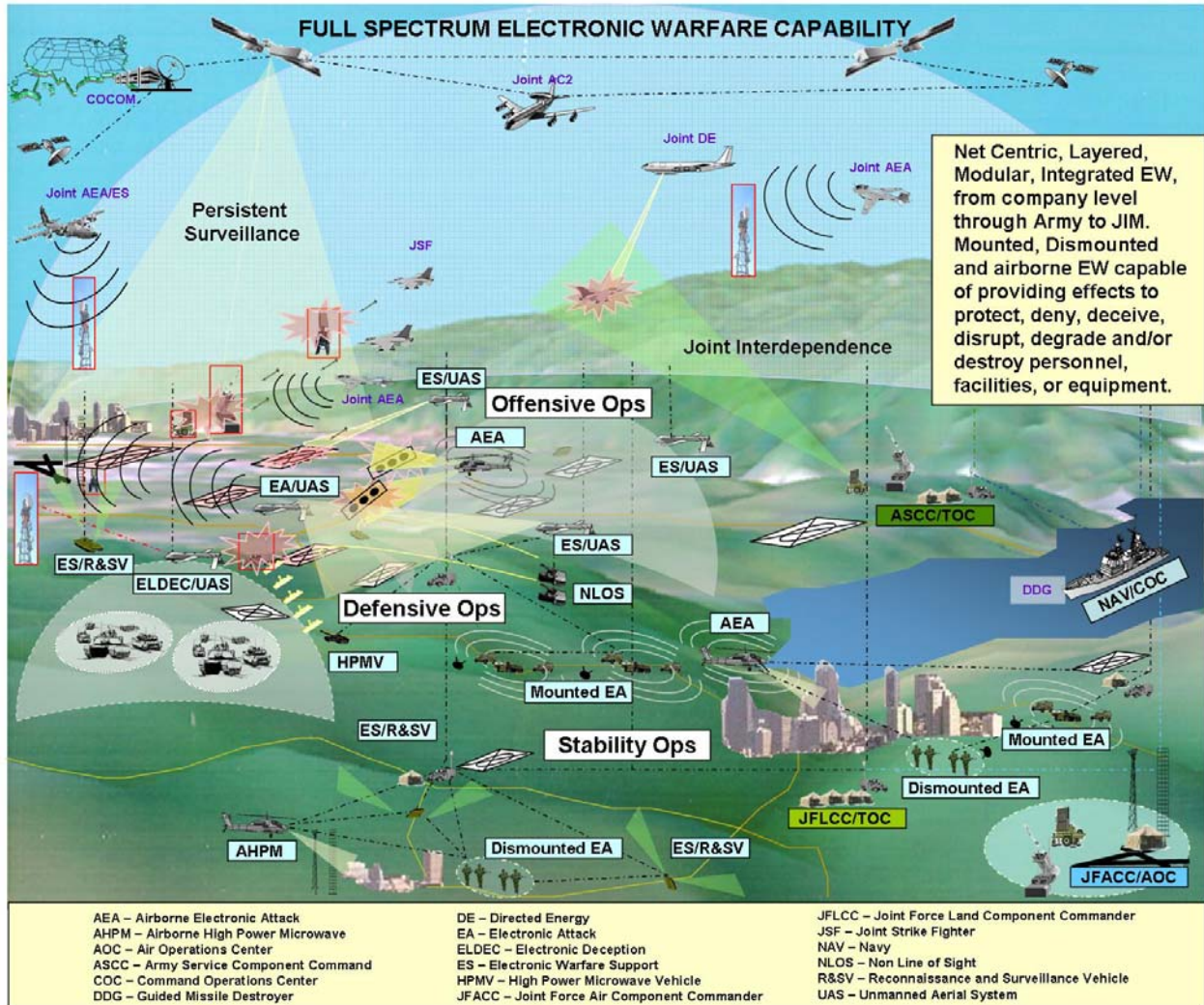


Figure 2-4. EW Integration

c. Figure 2-4 graphically depicts a way ahead for integrating EW into the Army. It starts with the seven key ideas articulated in the Army capstone, which when supported by both organic and nonorganic EW capabilities and applied across the warfighting functions in support of FSO, will provide the future Modular Force warfighter the ability to dominate the EMS within his OE against traditional and nontraditional threats throughout the spectrum of conflict. This EW integration is underpinned by a layered infrastructure of DOTMLPF, which is critical to its achievement.



**Figure 2-5. Evolution of the EW CCP**

d. Figure 2-5 depicts the evolution of the EW CCP and portrays the envisioned objective EW capability necessary to enable FSO. The mounted, dismounted and airborne EW capabilities depicted are not all-inclusive, but are used to illustrate the numerous EW related capabilities that are projected to be available, some of which may be integrated via conclusive analysis to provide an improved EW capability during the 2015-2024 timeframe.

e. Figure 2-5 Narrative

(1) The satellites along with the air and sea sensors are representative of the joint SIGINT surveillance assets which provide the force with persistent surveillance of the OE. This surveillance data, augmented by manned and unmanned air and ground based EW assets, provides the land force commander with the data required to create actionable intelligence. Based on this actionable intelligence, the land force commander can apply the required capabilities to realize the desired effects. These EW capabilities must provide the required effectiveness against the broadening target set in figure 2-2.

(2) The top third of the overview depicts joint airborne assets conducting EW operations in support of the joint task force. These assets are denying, disrupting and detecting adversary communications and conducting EA against adversary air and ground platforms. Below this umbrella of joint EW assets are combinations of current and future EW capabilities which will greatly enhance the land force commander's ability to conduct FSO. The actions to produce the effects listed in the top right box, are managed and controlled by the C2 architecture depicted by the component and functional operations centers.

(3) In support of the offensive operations (center of the overview), are two ES/UAS detecting, locating and identifying sources of EM energy and relaying that information to C2 nodes. The AEA platform is using EW techniques to destroy antitank/antiarmor mines ahead of attacking land forces, while a third EA/UAS is jamming an adversarial C2 node. Depicted in light grey is a brigade size deception force being replicated by C2 RF transmissions from an EA/UAS as part of the land force commanders overall deception plan.

(4) Supporting defensive operations are EW support reconnaissance and surveillance vehicles (both manned and unmanned) and an ES/UAS; providing threat warning, detection, location and identification of sources of EM energy, relaying that information over the network to update the COP and providing targeting information for engagement by the non line-of-sight batteries and HPM vehicles.

(5) In support of ongoing stability operations an AEA platform is using forward looking IR to locate hostile forces on a roof top and then engages the target with a DE weapons to drive the targets indoors to an awaiting blue force. The dismounted patrols are equipped with man portable remote controlled improvised explosive device (RCIED) countermeasures for protection against RCIEDs and nonlethal EA weapons to assist in riot control. Mounted forces are equipped with CREW systems and vehicle mounted nonlethal EA weapon systems. Manned and unmanned EW support reconnaissance and surveillance vehicles assist the stability forces in locating and identifying potential subversive forces through exploitation of the EMS.

(6) Supporting all the operations depicted in figure 2-5 are the joint and Army C2 facilities (Joint Operations Centers, Tactical Operations Centers, Air Operations Centers) and organizational cells (Joint IO Cell, electronic warfare coordination cell (EWCC)) which facilitate and enable the planning, integration and synchronization of EW support to operations. Not depicted, but equally important, are the EP active and passive measures used to protect personnel, facilities and equipment from the effects of friendly and enemy employment of EW. These measures are accomplished through: effective spectrum management; the hardening of equipment against EM threats; and the use of EMCON procedures.

## **2-6. EW Effects**

a. EW is waged to secure and maintain the use of the EMS for friendly forces and to deny the enemy an actual or perceived advantage in the same. EW can be applied from the air, land, sea, and space by manned and unmanned systems; and is employed to achieve desired effects of: control, detection, denial, deception, disruption and degradation, destruction, and/or protection. All EW effects will involve various levels of control; while controlling use of the EMS through

proper application of EW is advantageous, when not properly coordinated and integrated, it may adversely affect forces through fratricide or eliminate targets of high intelligence value. For example, an ill-timed jamming package may highlight an otherwise unobserved reconnaissance team or interfere with that team's use of the EMS. EW actions enable commanders to achieve the following effects as defined in joint publication (JP) 3-13.1.

(1) *Control.* Control of the EMS is achieved by effective management/ coordination of friendly systems while countering adversary systems. EA limits adversary use of the EMS; EP secures use of the EMS for friendly forces; and ES enables the commander's accurate estimate of the situation in the operational area. All three must be carefully integrated to be effective. Additionally, commanders should ensure maximum integration among EW, communications, ISR, and other IO capabilities.

(2) *Detection.* Detection is the active and passive monitoring of the battlespace for EM threats such as RF, EO, laser, IR and ultraviolet threats. This definition acknowledges that the actual threat may be the adversary perpetrating the EM interference but it is through the use of the EMS that enables friendly forces to detect the adversary. It is the essential first step in EW for effective exploitation, targeting defensive planning, and force protection. Friendly forces must have the capability to detect and characterize interference as hostile (jamming) or nonhostile (intentional or not intentional) EM interference.

(3) *Denial.* Denial is controlling the information an adversary receives via the EMS and preventing the acquisition of accurate information about friendly forces. Denial can be done by traditional jamming techniques, expendable countermeasures, or destructive measures. This definition does not exclude the possibility that future Modular Forces may also have to address other denial capabilities, such as nontraditional jamming and denial of service.

(4) *Deception.* Deception is confusing or misleading an adversary by using some combination of human produced, mechanical, or electronic means. Through the use of the EMS, EW manipulates the adversary's decision loop, making it difficult to establish an accurate perception of objective reality.

(5) *Disruption and Degradation.* Disruption and degradation techniques interfere with the enemy's use of the EMS (such as counter-C2) to limit their combat capabilities. This is achieved with electronic jamming, electronic deception and electronic intrusion. These enhance attacks on hostile forces and act as force multiplier by increasing adversary uncertainty, while reducing uncertainty for friendly forces. Advanced EA techniques offer the opportunity to non-destructively disrupt or degrade adversary infrastructure.

(6) *Destruction.* When used in the EW context, destruction is the elimination of targeted adversary systems. Sensors and C2 nodes are lucrative targets because their destruction seriously hampers the enemy's perceptions and ability to coordinate actions. ES supports destruction by providing target location or targeting information and combat assessment. Adversary systems that use the EMS can be destroyed by a variety of weapons and techniques, ranging from conventional munitions to DE weapons. While destruction of adversary equipment

is an effective means to deny the adversary use of the EMS, the duration of denial will depend on the adversary's ability to reconstitute.

(7) *Protection.* Protection is the use of physical properties, operational tactics, techniques, and procedures (TTP), as well as planning and employment processes to protect our use of the EMS. This includes ensuring that joint offensive EW activities do not electronically kill, destroy, or degrade our intelligence sensors and information systems. Protection is achieved by component hardening, EMCON, frequency management/deconfliction, and employing other IO and kinetic means to counterattack and defeat adversary attempts to control the EMS. Frequency management and deconfliction includes the capabilities to detect, characterize, geolocate, and mitigate EM interference that can affect operations. Additionally, organizational structures like a joint commander's electronic warfare staff or EWCC enhance EP through deconfliction of EW efforts. This definition does not attempt to provide an exhaustive list of all intelligence sensors and information systems such as unmanned platforms and C2 links. Even though these specific sensors and systems are not listed in this definition, they must also be protected from our use of the EMS.

b. In order to achieve one of the above defined effects, the achievement of several of the other effects may be necessary. For example, in order to deny the adversary use of the EMS, it is usually necessary to first detect their use of the EMS. Once detected, the denial of the adversary's use of the EMS could be achieved through the destruction of the identified system or the disruption of that system for a given duration of time. Current concept and doctrinal definitions of EW effects are focused denying the enemy's use of the EMS. However, there are EW capabilities (for example, DE weapons) which can affect target sets that are beyond the enemy's ability to use the EMS. The uses of a DE laser to destroy an aircraft or to disperse a crowd with a high power millimeter wave system are examples.

c. The EW effects as defined above can be achieved through the coordinated use of EA, ES, and EP capabilities applied across the seven key ideas of the Army's capstone concept. It is essential that the Army invest in EW capabilities that will enable the future Modular Force to achieve these effects and dominate the EMS within their operating environment.

## **2-7. EW Delivery**

Effects from EW can be delivered from a variety of platforms (organic and nonorganic) including, but not limited to, aircraft (fixed wing, rotary wing, UAS), ground vehicles (manned and unmanned), mobile or fixed ground systems (attended or unattended), ground troops, sea based, and space based.

## **2-8. EW within the Joint Campaign Framework**

a. The joint force will conduct a phased campaign to achieve assigned objectives. EW will provide a multi-layered and overlapping capability to enable the successful accomplishment of each of the campaign phases, within conventional, irregular, catastrophic and disruptive threat environments. EW will be waged on land, in the air, on the seas, and in space within the cyber/informational domains and is applicable across the ROMO. EW operations will have specific implications for planning and executing activities within the joint campaign.



b. The Army capstone concept proposes a future Modular Force capable of addressing the diverse challenges, threats, and volatile conditions expected to characterize the future operating environment through the adaptive combination of the seven key operational ideas below. The objective EW capability spans the breadth of all the Army key operational ideas and is vital to their successful accomplishment. To facilitate the vignette based description of Army EW operations in support of the future Modular Force this plan will concentrate on the Army's seven key operational ideas.

c. Vignette Operational Setting. The illustrative vignettes used in this CCP are built upon a notional scenario. National and ethnic tensions in the region have grown over a period of years and the new political regime of B-Land initiated a campaign to control the long disputed land area between B-Land and A-Land containing oil reserves (see fig 2-6). Several years have passed since the United Nations passed the resolution that detailed the 50-50 sharing arrangement of contested reserves. The new political regime now in place in B-Land refuses to acknowledge A-Land's right to the reserves and has moved military forces to the area to take control of the oil fields. A-Land does not have the military might to confront B-Land and does nothing militarily to reclaim the region. A-Land does make a plea to the United Nations and Allies for assistance. The United Nations condemns B-Land aggression and threatens sanctions. B-Land is bolstered by the lack of A-Land military response and assurance from C-Land that if sanctions are imposed, B-Land can depend on them to keep the oil flowing through their country. B-Land begins support of insurgent activities along the B-Land and A-Land border, focusing on population centers. Terrorist acts directed against oil and natural gas production and pipelines within A-Land increase. B-Land and C-Land initiate military training operations along their shared border in the northeast and in a show of force, C-Land repositions forces along its southern border. A-Land requests United Nations and U.S. assistance and shortly thereafter the U.S. President authorized military intervention.

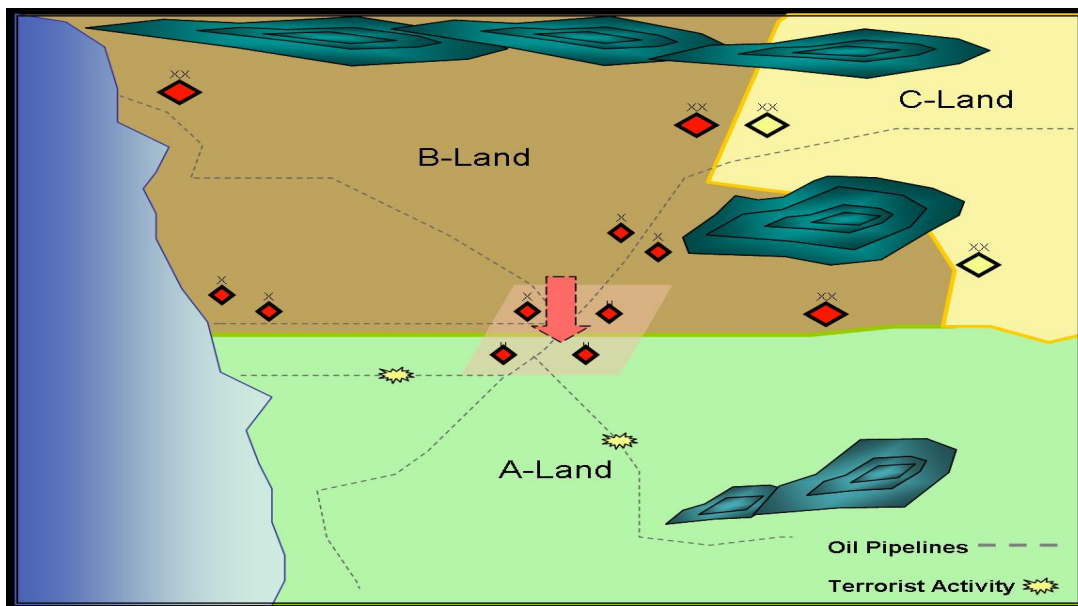
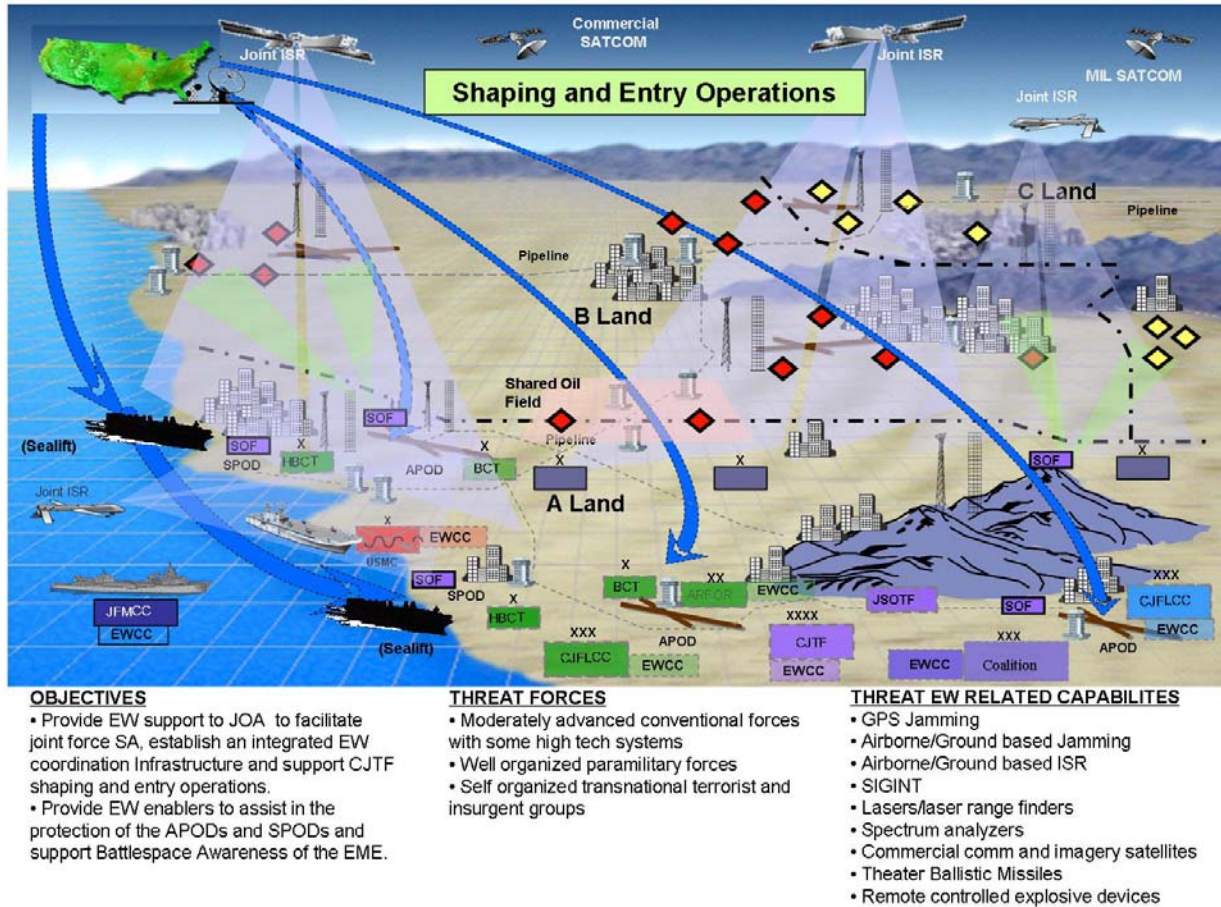


Figure 2-6. Vignette Operational Setting

(1) *Shaping and entry operations* shape regional security conditions, and if forces are committed, they shape the OE, help seize the initiative, and set conditions for decisive maneuver throughout the campaign. Use of multiple entry points will help overcome enemy anti-access actions, enhance surprise, reduce predictability, and through the conduct of immediate operations after arrival produce multiple dilemmas for the enemy. Army future Modular Force shaping operations include actions intended to shape regional security conditions and as such are an integral part of the joint prepare and posture phase of a joint campaign (see fig 2-7). Shaping and entry operations shape the OE and set conditions for decisive maneuver.



**Figure 2-7. Shaping and Entry Operations**

(a) The joint force commander, staff and component commanders conduct crisis action planning to update existing contingency plans and initiate shaping and early entry operations. The combined and joint force maritime component commander (CJFMCC) initiates deployments to gain maritime superiority, secure and establish the sea ports of debarkation in west A-Land, and open LOCs to the east. A Marine expeditionary brigade (MEB) deploys ashore on the western coast of A-Land is placed under the tactical control of the combined and joint force land component commander (CJFLCC). The combined and joint force air component commander (CJFACC) positions an air expeditionary force in southern A-Land to conduct flexible deterrence options, establish air superiority, and conduct initial air operations in support of combined joint

task force (CJTF) forces and coalition partners. The joint force commander's EW staff, headed by the command EW officer is the primary coordinator of the EW functions. During shaping operations, the joint commander's electronic warfare staff assessed the staffing requirements for the planning and execution of EW, monitored theater EW activities in A, B, and C-Lands and coordinated EW planning and courses of action development with the joint force command's components and coalition liaison officers. As the JTF begins entry operations and component headquarters are stood up, the joint commander's electronic warfare staff will request that the joint force commander standup a joint EWCC, and subordinate components are requested to activate their EWCCs. The CJFLCC, initiates deployment of two Future Combat System (FCS) brigade combat teams (BCTs) by air, and two Army heavy BCTs via sea lift along the western coast of A-Land. A joint special operations task force (JSOTF) conducts reconnaissance and secures the aerial port of debarkation (APOD) and sea port of debarkation (SPOD) in A-Land and assists in coordinating arrival of the BCTs and MEB. Additionally, the JSOTF begins reconnaissance operations and cooperative training with coalition military partners. End state for the shaping and early entry operations include-

- CJFMCC established maritime superiority and opened SPODs.
- CTF forward prepared to deploy and establish initial lodgment area.
- FCS BCTs prepared to deploy to western APODs to secure and defend the APODs.
- CJFLCC lead elements of an Army corps headquarters and the lead elements of one division initiating deployment operations.
- CJFACC air operations center and air expeditionary force operational in A-Land. CJFACC conducts flexible deterrence options and if required, surveillance and reconnaissance operations, and joint strike operations to shape the OE.
- JSOTF forces in conjunction with coalition partners conducting reconnaissance and counterinsurgency operations, and providing targeting data to degrade anti-access operations vicinity of SPODs and APODs.

(b) There are a wide range of national, civil, and commercial systems and capabilities that operate within the EMS, which will influence military operations. During shaping and entry operations, the future Modular Force relies on the strategic and operational levels of EW and EW support systems. Key EW based systems and EW operations that enable shaping and early entry operations include-

- National, civil, and commercial space-based and other non-space based collection systems provide the platforms, and sensors that enable the collection, processing and dissemination of a wide range of information. Examples of information that support early entry and shaping operations include ISR, SIGINT, and geospatial data, which provide many types of imagery, weather and environmental data, position, timing and navigation data, radar, early warning systems, knowledge of enemy communications, and a characterization of the communications environment.
- The management and operation of strategic and operational level EW systems, and their links to the global information grid (GIG) provide the ability to fuse, share and relay information from a wide variety of sensors and sources in order to support operational planning and comprehensive situational awareness (SA) at home station and in theater.

- Space-based and airborne assets assist the CJTF commander and subordinate component commanders in the search for, interception, identification and location of radiated EM energy. This information can then be used for immediate threat recognition, targeting, and planning. CJFLCC planning and early entry operations include plans to combat WMD and theater ballistic missiles by considering interdiction, direct and indirect attacks, or WMD, theater ballistic missile elimination options.
- Actions to establish sustained control of the EMS are initiated to support shaping and early entry operations, and deny or disrupt the threat's ability to leverage its access to EM-based systems, services, and products. These include threat access to unconventional means of C2 such as internet, satellite telephones, e-mail, and television.
- Joint force information requirements drive the reprioritization, direction and redirection of national technical means satellites and ISR assets. Priority of collection efforts go to the northwestern port cities, the threat conventional forces of B-Land, and the APODs and SPODs on the western sea board of A-Land.
- CJTF staff coordinates with A-Land military and civil officials to determine the guarded, protected, and taboo frequencies within A-Land. This information is widely disseminated over the GIG.
- CJTF EW staff coordinates with A-Land EW staff to ensure A-Land capabilities are fully integrated into CJTF EW operations.
- The management and operation of tactical level EW systems, is coordinated by the deploying force's EWCC with the asset planners and operators and the information is fused, shared, and relayed via GIG to deployed force headquarters and coalition partners in support of future operations.
- A combination of national sensors and tactical systems provide an integrated picture of the EMS to the Army battle command system (ABCS) and emerging battle command systems, which will assist in spectrum management operations, target identification, threat warning and strike operations against conventional and asymmetric threats.
- During initial entry operations the land component commander requests strategic and operational EW support assets through the joint EWCC to support and augment tactical level operations.
- Army EW officers at echelon from corps to battalion ensure the planning and integration of EW operations in support of the land forces. This includes integration with joint and coalition partners.

(c) During shaping and entry operations Army EW capabilities will contribute to the overall understanding of the EME; provide indications and warning; enemy disposition, and indicators of intentions. EW capabilities can be used to prevent threat intelligence collection on friendly forces (for example using advanced EMS obscuration) and disruption of friendly sensors that may be in or near threat-controlled space. Additionally, EW capabilities can be used to support counterreconnaissance and sensor disruption, deception operations, furthering PSYOP actions, and as part of a capabilities demonstration conducted for deterrent purposes.

(2) *Operational maneuver from strategic distances* into a crisis theater will enable the force to deter or promptly engage an enemy from positions of advantage. Employing advanced joint lift platforms not dependent on improved ports, the future Modular Force will deploy modular, scaleable, combined arms formations in mission-tailored force capability packages, along simultaneous force flows, to increase deployment momentum and close the gap between early entry and follow-on campaign forces. During both the prepare and posture and shaping and entry operations of a campaign, rapid deployment of ground formations strengthen the joint force commander’s ability to deter conflict, limit its escalation, or preclude early enemy success. Units capable of immediate employment upon arrival diminish an enemy’s maneuver options. As the theater matures, forces flow from locations outside the theater with some deploying directly into objective areas while others flow through more traditional staging bases or lodgments (see fig 2-8).



**Figure 2-8. Operational Maneuver from Strategic Distances**

(a) The joint force and land component rapidly project modular combined arms forces into the joint operations area (JOA). Where possible these mission tailored force packages bypass intermediate staging bases and deploy in combat-ready unit configurations to carefully

selected positions of advantage, and initiate operations immediately upon arrival. Priority of effort is to the air deployed BCTs to western A-Land to secure APODs and oil refineries; and the deployment of CJFLCC elements to central A-Land to coordinate future operations with coalition partners to secure the border between A-Land and B-Land. As the theater matures, forces flow from outside locations to initial lodgment areas and in some cases directly to objective area locations. CJFMCC maintains maritime superiority, continues to expand the SPOD in west A-Land and expands LOCs to the north. CJFACC maintains air superiority, conducts strategic and intratheater lift operations, establishes air exclusion zones, executes counter-air operations, conducts ISR, and air operations to degrade enemy anti-access capabilities.

(b) The deputy area air defense commander or the theater area AMD coordinator extend the protection of AMD priorities and ensure the integration of all required space enablers to obtain early warning and cue AMD systems as the JOA expands. CJFLCC establishes entry points, secures critical infrastructure, and conducts military operations in support of A-Land forces against B-Land conventional forces as well as paramilitary, insurgents and transnational terrorists. Two brigades prepare for intratheater operational maneuver. JSOTF continues to conduct reconnaissance and cooperative training with coalition military partners. End state for the operational maneuver from strategic distance operations includes-

- CJFMCC established maritime superiority, SPOD fully operational and EWCC operational.
- CJTF forward operational in fixed facilities, joint EWCC operational.
- FCS BCT air deployments complete, APODs and oil refineries in the west are secure, conducting coordinated operations with A-Land forces.
- CJFLCC entry points established, combat forces in theater, continues to secure critical infrastructure, conducting initial operations in support of A-Land forces and combating unconventional forces in AOR. CJFLCC EWCC stood up and operational. Tactical UAS platforms conducting ES missions.
- CJFACC air operations center and air expeditionary force operational in A-Land, strategic lift 70 percent complete, maintains air superiority, conducting air operations in support of the joint force commander's objectives. CJFACC EWCC is operational. Airborne platforms providing EW operational support in the JOA.
- JSOTF forces in conjunction with coalition partner continue reconnaissance and counterinsurgency operations.

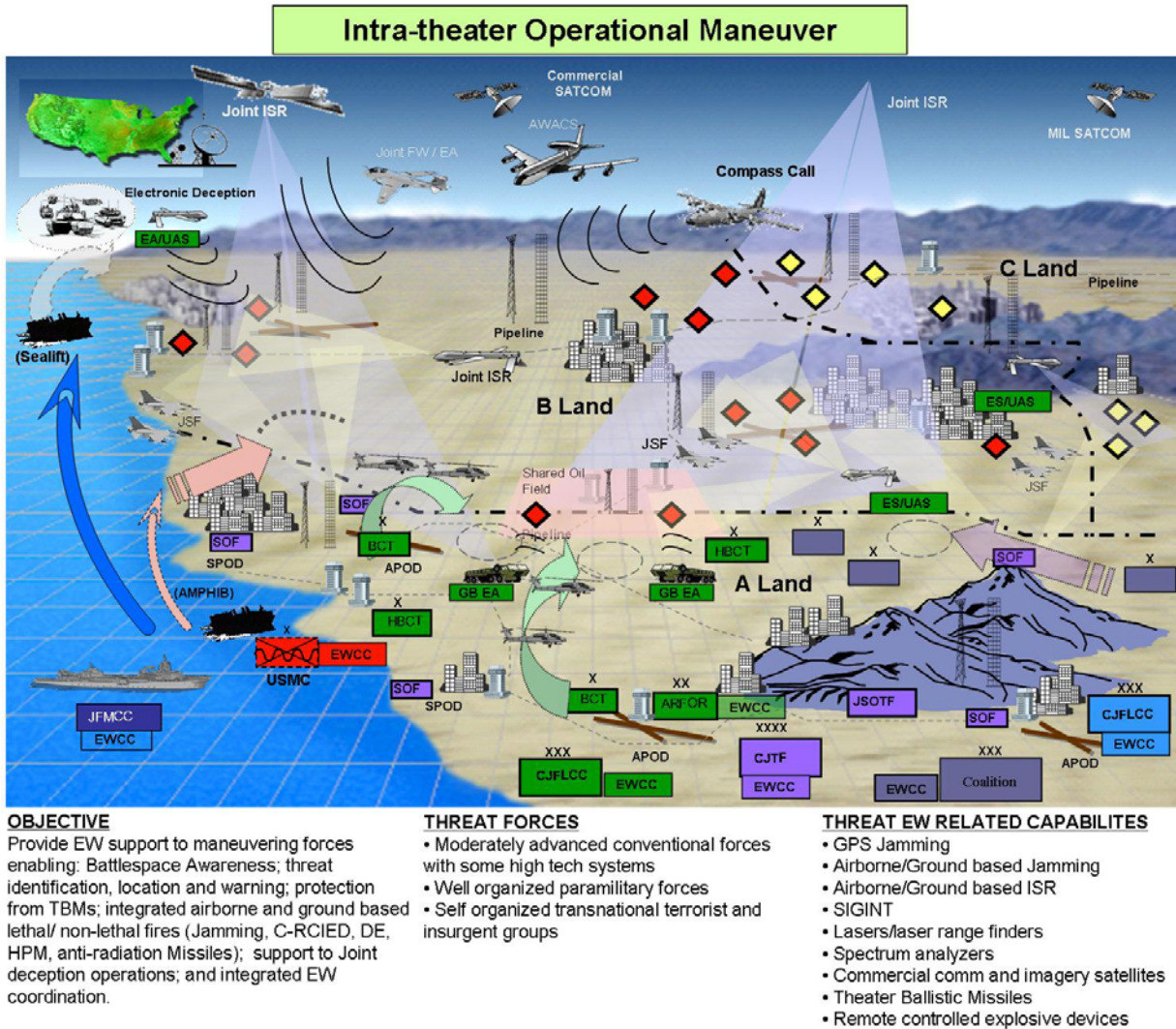
(c) The EW enabling systems and operations initiated during the shaping and early entry operations continue to support operational maneuver from strategic distances. Key EW operations that enable operational maneuver from strategic distances include-

- Operationally responsive airborne EW assets are on station and able to provide EW support to deployed forces. The strategic and operational layers of EW support expand to support the additional requirements as the theater matures.
- EP capabilities ensure that the position, velocity, timing and navigation capabilities used to aid SOF and strategic deployment operations are accomplished with the accuracy and precision required.

- EA systems are employed to counter enemy efforts to detect or engage friendly forces as they flow into theater.
- EM deception is used in support of the overall joint force deception plan to confuse the B-Land forces as to the intent and location of deploying forces.
- Dissemination of EW threat warning/threat recognition data is tailored to meet expanding force requirements.
- Deployment of tactically responsive, medium and low altitude EW UAS to support future tactical operations, (tactical layer) is initiated. Purpose is to establish a dedicated, persistent layer of EW support (ES and EA) for subsequent force movements and decisive operations.
- EW operations focus on support for entry and initial operations areas in order to deny or disrupt the enemy's use of the EMS for information systems and ISR.
- EWCC's at joint, coalition, and Service echelons are operational, and EW officers at each echelon continue the planning and integration of EW in support of land force operations.

(d) In support of operational maneuver from strategic distances, EA capabilities are necessary to counter enemy detection and engagement of deploying forces in transit; to support deception as forces arrive and begin combat operations; and to neutralize threat C2 and ISR capabilities. ES capabilities will contribute to continued real-time SA and situational understanding (SU) of the threat, and EP capabilities will protect our 'assured communications' so that we can deploy and transition smoothly to combat operations.

(3) *Intratheater Operational Maneuver.* The future Modular Force executes intra-theater operational maneuver to extend the reach of the joint force enabling the joint force commander to respond to uncertainty, isolate portions of the battlefield, exploit success, and accomplish key campaign objectives. Intratheater operational maneuver can secure positions of advantage to destroy key capabilities and forces, extend tactical reach, achieve surprise, accelerate the advance of the overall force, and block enemy forces (see fig 2-9).



**Figure 2-9. Intra-theater Operational Maneuver**

(a) The CJFLCC executes the intratheater operational maneuver of the main effort (two BCTs from the Army division) using a combination of intratheater lift and ground maneuver to secure blocking positions and prepare to attack B-Land forces within A-Land territory. The coalition division and MEB, supporting effort, are maneuvered to positions in the northeast and northwest to secure blocking positions to prevent enemy forces from reinforcing B-Land forces within A-Land. Joint and Army ISR, and EW systems and platforms support the maneuver of both divisions and the MEB. CJFLCC airborne and ground based EA assets, combined with organic and joint fires, provide fire support to both divisions and the MEB. EW support and fires are planned, coordinated, and synchronized by the established joint, coalition, and Service EWCCs.

(b) EWCCs. Along with national intelligence and theater AMD assets, theater, and organic ES assets protect maneuvering forces by providing early warning, threat identification and warning, and targeting information throughout the JOA. CJMCC takes operational control of the MEB during its intratheater maneuver to the southwest coast of B-Land, and chops tactical



control of the MEB to CJFLCC once ashore. In coordination with CJMCC and sealift forces returning to the continental U.S., CJFACC provides an extended range UAS to support CJFLCC electronic deception operations in northwest B-Land for the purpose of holding the enemy division there in place. JFACC conducts ISR and combat air patrol operations along the border between A, B, and C-Land in the east. JSOTF deploys SOF teams to B-Land to conduct reconnaissance and continues cooperative training with coalition military partners. End state for the intratheater operational maneuver operations includes-

- CJFLCC Army forces establish blocking positions in north A-Land and preparing to conduct attacks on B-Land forces to drive them from A-Land and restore the territorial boundary of A-Land. The coalition division in the northeast preparing to establish a blocking position in southeast B-Land to prevent the division from providing reinforcement to B-Land forces in A-Land. The MEB in the northwest is ashore and has established blocking positions to prevent B-Land's northwest division from providing reinforcement to B-Land forces in the south. One heavy BCT provides security of the oil pipelines and production infrastructure in west central A-Land.
- CJFACC and CJFLCC air assets complete the intratheater lift of the two FCS BCTs in the north, maintains air superiority throughout the JOA, provides ISR of C-Land forces and contributes to the area air defense and joint fires effort.
- CJMCC completes transit and amphibious landing of MEB forces in the northwest A-Land, assist in deception efforts in northwest B-Land, maintains maritime superiority, and contributes to the area air defense and joint fires effort.
- Combined JSOTF positions SOF teams within B-Land to provide reconnaissance and surveillance of enemy forces in northwest and southeast B-Land, in conjunction with coalition forces continues counterinsurgency operations in A-Land, provides targeting information to joint strike forces.

(c) The EW operations initiated during previous operations continue to support intratheater operational maneuver. The key EW operations that enable intratheater operational maneuver include-

- Joint EW systems focus on EMS areas of interest, including enemy locations, sensors, objective areas, routes, and airfields. The identification and localization of radiated EME of B-Land forces is a high priority for ES assets.
- Joint EA operations focus on denying the enemy the ability to use EW systems to attack, track and monitor CJTF operations and forces.
- Operationally responsive joint and organic EW assets are on orbit to provide requested EA and ES support to the CJFLCC.
- Tactically responsive, long endurance EW capable UASs provide CJFLCC forces dedicated and persistent ES and dedicated EA platforms.
- The ES UAS systems use over the horizon and beyond line of sight data links to provide location and targeting data to both unmanned and manned EA systems in support of attack operations. Similarly, these systems provide critical information to the ABCS to enhance SA. Commanders are able to task and re-task the EW sensors

- and platforms (in direct support) to ensure local SA, and satisfy information requirements for current operations and the planning for decisive operations.
- Dissemination of electronic threat warning is tailored to the needs of the expanding force.
  - CJFLCC EA UAS assets provide electronic deception support to deception operations in the northwest of B-Land.
  - Enhanced EW reprogramming via data link enables dynamic distribution of electronic order of battle information to EW manned and unmanned systems.
  - EWCCs and EW officers at each echelon continue the planning and integration of EW operations in support of the land forces.

(4) *Decisive maneuver.* The future Modular Force executes decisive maneuver to achieve the operational tasks assigned by the joint force commander. It is characterized by simultaneous, distributed operations; direct attack of enemy decisive points and centers of gravity and controlled operational tempo (see fig 2-10).

(a) The CJFLCC executes decisive, simultaneous, distributed operations to conduct a direct attack of enemy forces in north central A-Land (main effort) to drive B-Land forces from A-Land territory; and defensive operations against B-Land forces in the northwest and northeast to ensure the security of attacking forces (supporting effort). Supporting CJFLCC defensive operations in northwest and southeast B-Land, joint airborne forces conduct offensive operations against B-Land forces in the northwest and north east. CJFMCC maintains LOCs security and conducts operations to prevent paramilitary force disruption of sustainment operations.

(b) CJFLCC aviation assets (including UASs with EW payloads), combined with joint fires, continue to support the maneuver forces. The CJFACC maintains air superiority, provides joint fire support and conducts reconnaissance operations to monitor threat force movement in B and C-Land. Combined JSOTF positions SOF teams within B-Land to provide reconnaissance and surveillance of enemy forces in northwest and southeast B-Land, conducts counterinsurgency operations in A-Land, and provides targeting information and support to joint strike forces. End state for this operation includes-

- CJFLCC forces destroy B-Land forces and restore the territorial integrity of A-Land. C-Land forces are prevented from conducting any cross border operations. Paramilitary forces are incapable of conducting operations above team level. A-Land's domestic infrastructure and government are intact and coalition forces are conducting security operations throughout the northern and western provinces of A-Land.
- CJFACC maintains air superiority throughout the JOA and provides area air defense and joint fires as required.
- CJMCC maintains maritime superiority and contributes to the joint area air defense and fires effort as required.
- Combined JSOTF retains SOF teams within B-Land to provide continuous reconnaissance and surveillance of enemy forces in B-Land. In conjunction with coalition forces, continues counterinsurgency operations in A-Land. Continues to provide targeting information to joint strike forces.

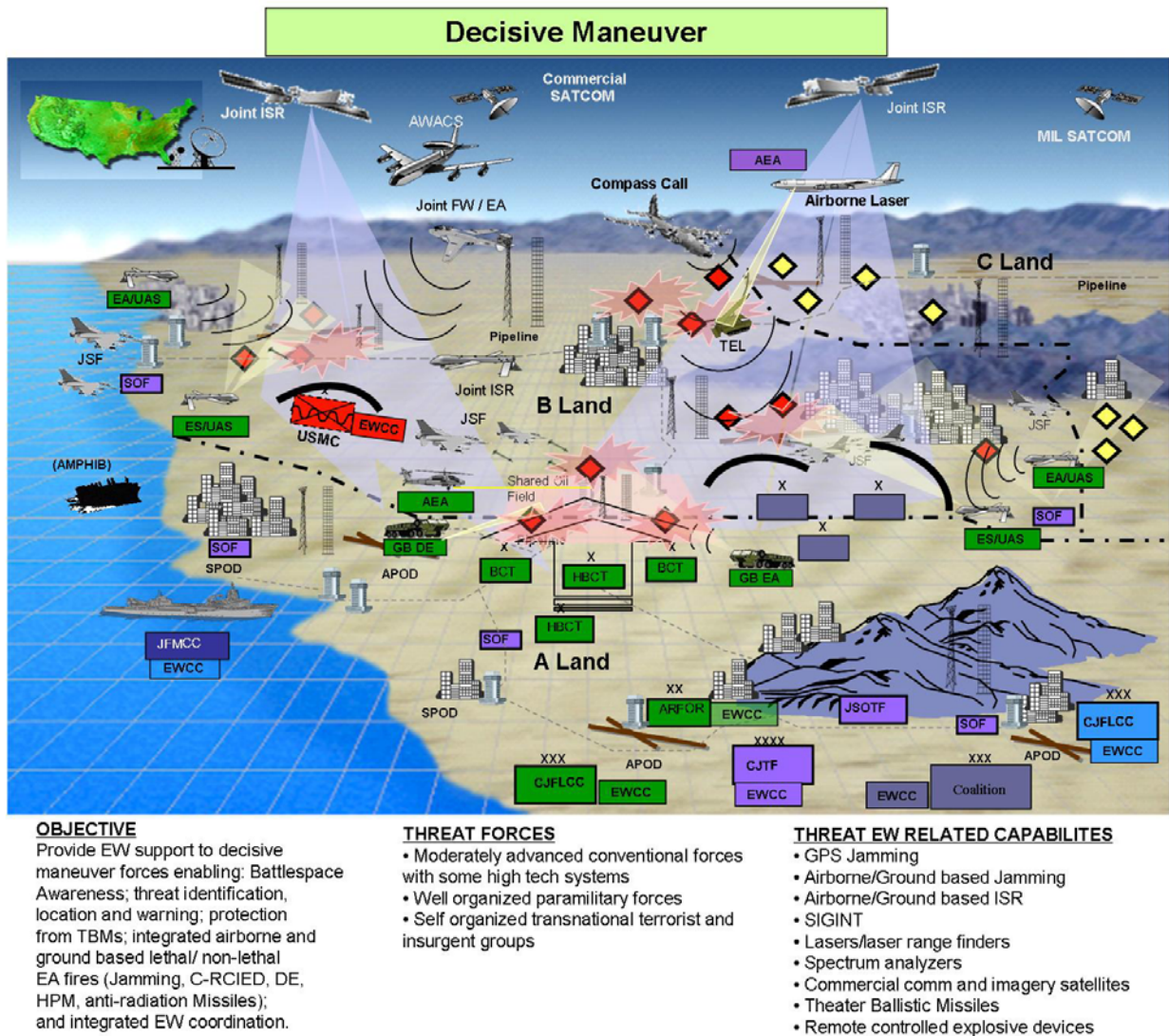


Figure 2-10. Decisive Maneuver

(c) The EW systems and operations initiated during previous operations continue to support decisive maneuver operations. Key EW systems and operations that enable decisive maneuver operations include-

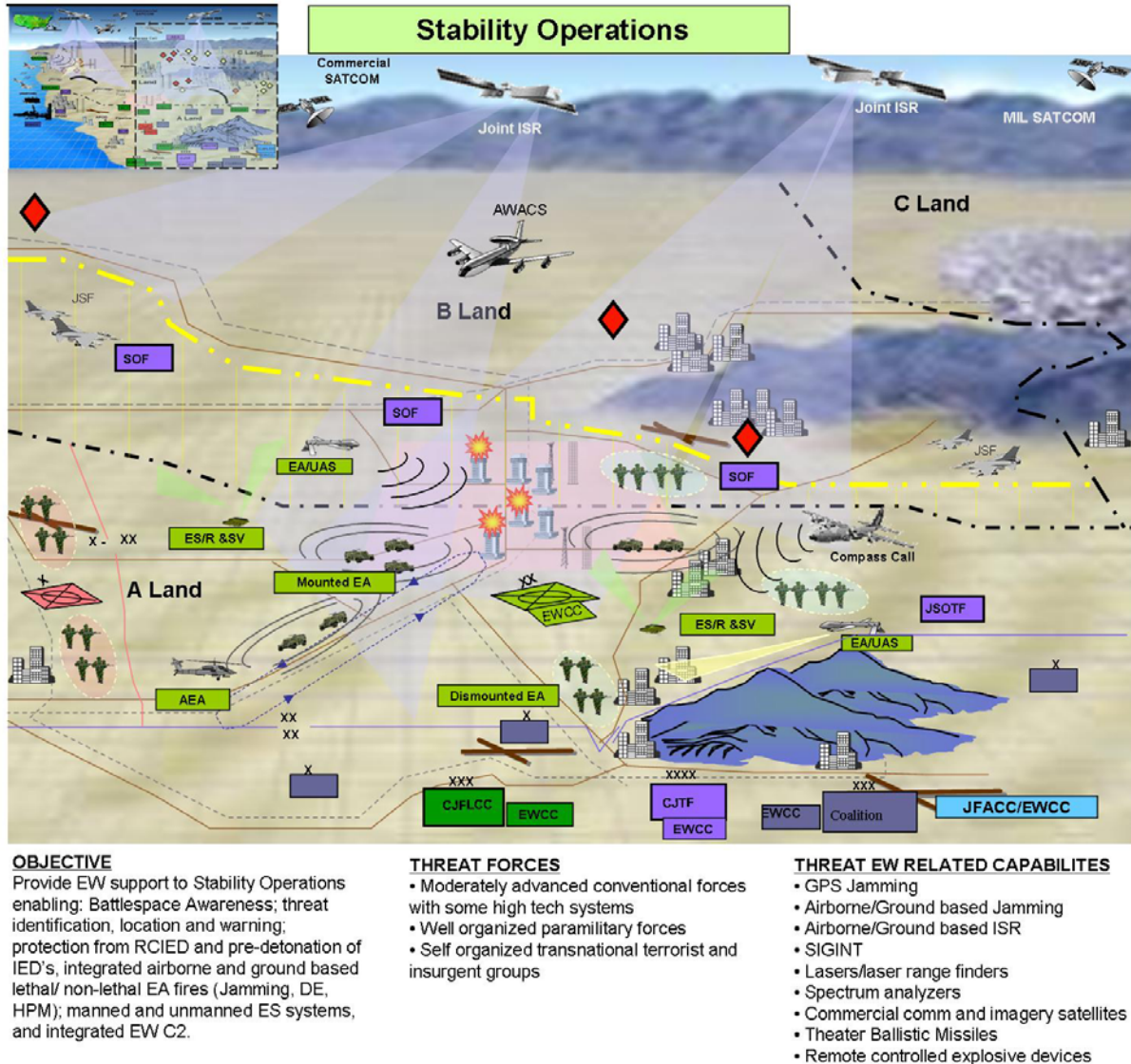
- Operationally responsive joint air and space, and national non-space based capabilities are on station to provide requested EA and ES support to the CJFLCC.
- Joint collection efforts focus on EMS areas of interest, including enemy locations, sensors, objective areas, routes, and airfields. The identification and localization of radiated EME of B-Land forces remains a high priority for ES assets.
- Joint and CJFLCC attended, unattended, and man portable ground based ES assets are deployed to enhance EMS battle space awareness and are networked via data links to the ABCS to update the COP and provide support to targeting.

- Joint and CJFLCC EA operations focus on attacking enemy systems used to C2 forces and enemy equipment relying on EME to operate. EA attacks against C2 and integrated air defense systems include jamming; DE; HPM, and EM pulse weapons.
- Tactically responsive, long endurance EW capable UAS's provide CJFLCC forces dedicated and persistent ES and EA platforms.
- Tactically responsive airborne manned and UAS EA platforms are providing in-flight targeting updates via beyond line of sight command data links enabling the denial or disruption of adversary acquisition and tracking systems, to include denial of service capabilities.
- CJFLCC EA operations in support of force protection include airborne and ground based assets used to counter RCIED (jamming to prevent detonation) and pre-detonation techniques.
- Management of the EMS is critical to EW operations success. Joint and CJFLCC spectrum operations focus on enabling electronic systems to perform their functions without causing or experiencing unacceptable interference to friendly or host nation systems.
- EP capabilities support 'assured communications' for maneuver support and sustainment forces through-electronic equipment hardening against both friendly and enemy EA; management of the EMS, including frequency deconfliction; and the implementation of EMCON procedures.
- EP of equipment and the use of EMCON procedures protect friendly C2 systems used to support combat identification, joint blue force tracking and SA for maneuver forces.
- EA ground based and airborne operations deny the enemy the ability to use space based and terrestrial RF systems to C2 their units, isolating them from their higher headquarters.
- EA operations against enemy position, velocity, timing and navigation data, deny and disrupt the enemy's precision fires and strike operations; supporting friendly air and ground maneuver forces.
- EWCC operations and the EW officers at each echelon continue the integration of EW into decisive operations ensuring land forces capitalize on the EW capabilities available to them.

(d) EW enabling capabilities support decisive maneuver by assisting in the identification and location of the adversary; providing friendly forces indications and warning and targeting data; and by providing lethal and nonlethal fires to deny, disrupt, or destroy adversary C2, personnel, equipment, and facilities. The effective management of the EMS through spectrum operations, EMCON and the hardening of friendly systems against EW threats is also critical to ensure effective EW support to operations. EWCCs and skilled EW personnel are the cornerstone for ensuring the proper planning, coordination, and synchronization of EW operations.

(5) *Concurrent and subsequent stability operations.* The future Modular Force will conduct stability operations throughout the campaign, often simultaneously with major combat operations. Stability operations (see fig 2-11) present significantly different operational requirements to the future Modular Force. They place a high premium on multifunctional units

and Soldiers, involve dynamic mission tailoring, integrate and synchronize the actions of JIM entities. At the core of this challenge is the requirement to maintain continuous pressure against hostile elements, such as terrorists or insurgents, to deny them freedom of movement and action over an extended period of time.



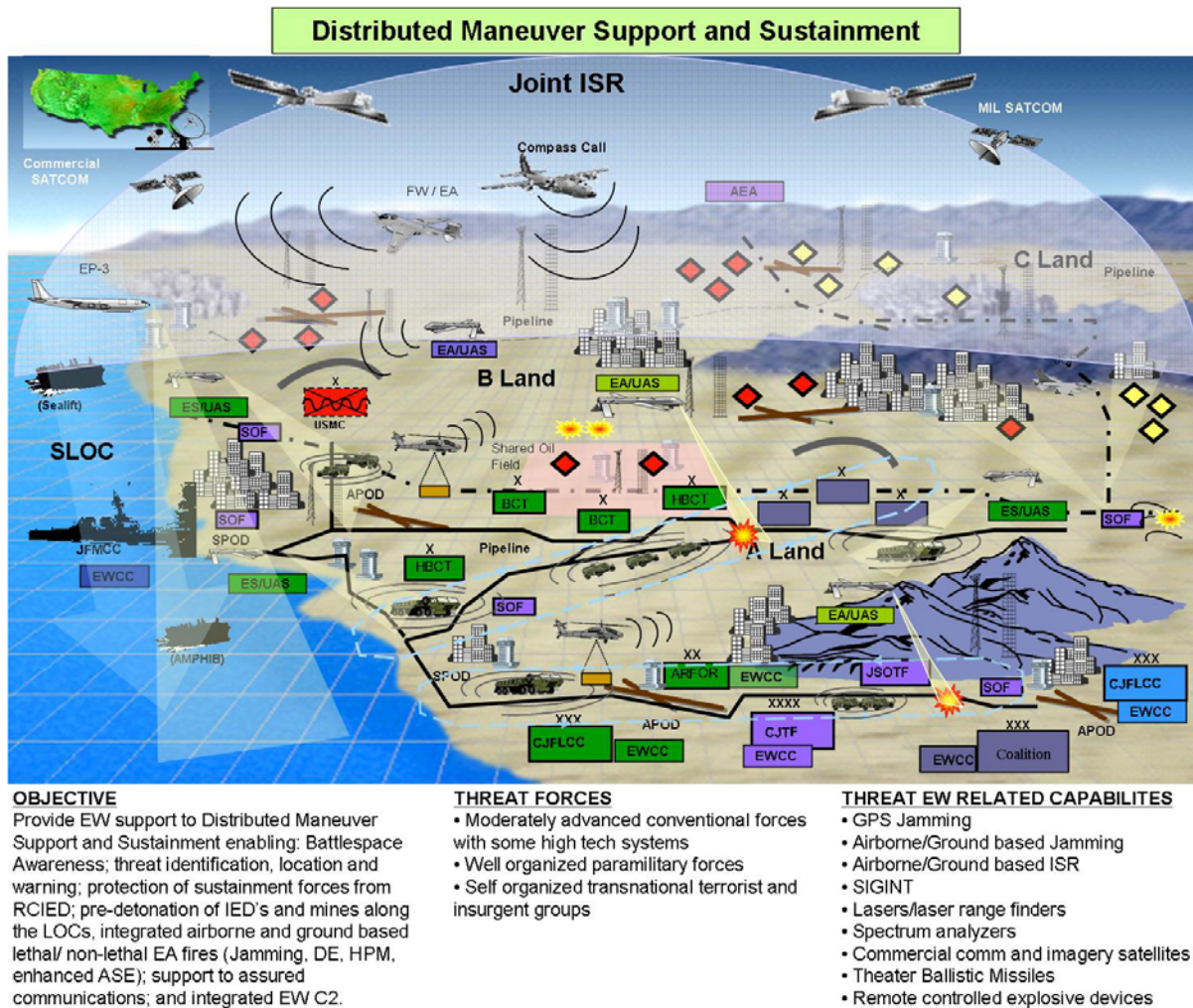
**Figure 2-11. Stability Operations**

(a) Successful decisive maneuver operations destroy a majority of enemy forces located within the disputed oil fields shared by A-Land and B-Land. The remainder of B-Land's conventional forces has withdrawn beyond a buffer zone, which was established north of the A-Land/B-Land border. The B-Land paramilitary forces operating in and around the oil fields have withdrawn or fled to the urban areas on either side of the border. These forces initiate ambush and improvised attacks using remote controlled devices on the LOC. Paramilitary forces target oil pipeline pumping stations and above ground segments within A-Land and the share oil fields between A-Land and B-Land.

(b) Insurgents operating in and around the border cities conduct attacks against A-Land government and municipal facilities in an effort to undermine the government. In a coordinated effort the JTF, in conjunction with its coalition partner, multinational entities and interagencies, conduct stability operations throughout the JOA. The CJFLCC conducts counterinsurgency operations in and around the northern border cities with mission tailored forces. These forces team with national and local civil authorities to ensure synchronization of action. A future Army division, using a heavy BCT and two FCS BCTs conduct security operations to secure the oil pumping facilities and its major pipelines within the shared oil field. One heavy BCT protects the LOCs within the north central AO. The coalition division provides security operations in the southern AO. The MEB conducts security operations in the western AO. CJFMCC continues maritime LOC security and operations to defeat remaining maritime paramilitary forces. CJFACC conducts intratheater lift operations to support stability and humanitarian operations in the north central AO, conducts reconnaissance, and provides joint fire support as required. Combined JSOTF conducts counterinsurgency operations within the northern border cities, and civil military operations in support of stability operations. End state for this operation includes-

- CJFLCC and coalition partners reduce the insurgent threat to a level civil authorities are able to manage. The remaining paramilitary forces are defeated and the shared oil field's pipelines and production infrastructure are intact. Local security missions in the north, north central, and west are being transferred to coalition units.
- CJFMCC defeats remaining paramilitary forces operating within A-Lands territorial waters.
- CJFACC continues intratheater lift operations as required and begins the transition to coalition and civil operations and control.
- The government of A-Land is intact and fully functional.
- A heavy BCT and two FCS BCTs maintain security of the shared oil field.
- Negotiations for a political settlement concerning the shared oil field between A-Land and B-land have been initiated.
- The EW systems and mission sets initiated during previous operations continue to support stability operations. Key EW systems and operations that enable stability operations include:
  - Networked airborne and ground based ES systems support the tracking of small and widely dispersed threat forces.
  - Airborne EA systems conduct area and point to point sweeps in support of pre-detonation operations against IEDs and other mines.
  - Remote controlled ES ground vehicles provide threat indications and warning, and targeting data to friendly forces conducting security operations.
  - Airborne, mounted, and dismounted EA systems provide: force protection from RCIEDs; and lethal and nonlethal fires in support of counterinsurgency and security operations.
  - Airborne and mounted HPM systems support crowd control and shepherding operations against hostile crowds and insurgents operating from building tops.
  - EWCC operations and the EW officers at each echelon continue the integration of EW into stability operations ensuring land forces capitalize on the EW capabilities available to them.

(6) *Distributed support and sustainment*. Distributed maneuver support and sustainment (see fig 2-12) are integrated throughout all phases of future Modular Force operations. Collectively they provide a significant portion of the backbone and infrastructure enabling the success of the future Modular Force. Integrated maneuver supports helps shape the OE and combines a variety of functional capabilities such as military police; engineers; aviation; and chemical, biological, radiological, and nuclear assets to accomplish the following tasks: understand the OE, enable theater access, provide assured mobility, deny enemy freedom of action, enable force protection and security, engage and control populations, and neutralize hazards and restore the environment. Maneuver sustainment focuses on the continuous, precise, and assured provisioning of the deployed Army and supported other Service forces. To achieve this, sustainment must flow through a fully integrated national to theater to tactical distribution system. Continuous sustainment presumes global resource management and depends upon a unified joint theater and global logistics C2 structure.



**Figure 2-12. Distributed Support and Sustainment**

(a) The CJFLCC conducts decisive operations with two divisions and one MEB. Although the Army division is designated the main effort, maneuver support and sustainment

forces play significant roles in shaping and controlling the OE for the entire force and ensuring their continuous sustainment.

(b) The combat support brigade maneuver enhancement (CSB ME) may control a specified AO. The CSB ME will allocate space, designate base and base clusters, and define the subordinate AO for self defense purposes. The CSB ME provides maneuver support (fully integrated with assured mobility and protection capabilities), and terrain management within an assigned AO. The CSB ME has an area operations cell which contains a fire support element where EW personnel reside. The brigade will maneuver throughout their AO and employ direct and indirect fires to support operations. Additionally, the CSB ME will provide the C2 for units with the capability to detect and neutralize explosive hazards within the CSB ME AO and on an area basis within the division. The CSB ME may also have smoke companies attached and the CSB ME staffs must synchronize, deconflict, monitor, and interpret the effects of advanced obscuration on the EMS. Lastly, the CSB ME will C2 military police units who are likely to employ nonlethal weapons.

(c) Military police units conduct maneuver and mobility support and area security operations, ensuring the smooth flow of forces and resources along the LOC, and internment and resettlement operations to support refugee and displaced persons to minimize noncombatant interference with ongoing and future operations. These operations are closely coordinated with coalition and multinational partners, government agencies, and supporting nongovernmental organizations. Additionally, MPs perform law and order operations partnering with host nation and multinational organizations to establish a stable operating environment, area security operations to protect critical assets, and police intelligence operations in order to provide operational commanders with critical criminal intelligence that impacts operations traffic control and circulation operations ensuring the smooth flow of forces and resources along the LOCs.

(d) Engineer units maintain the LOCs, enhance mobility in complex terrain, monitor the status of critical infrastructure, and assist coalition government in the provision, repair, and reconstruction of essential services.

(e) Aviation units support reconnaissance and surveillance operations in noncontiguous areas of the OE, conduct operational and sustainment lift operations, and when necessary conduct attack and security operations to support the protection of combat, maneuver support, and sustainment forces.

(f) Chemical, biological, radiological, and nuclear units conduct reconnaissance and surveillance operations to identify the full range of chemical, biological, radiological, and nuclear contamination, to include weapons research, development, production, storage, and delivery systems, as well as, toxic industrial materials within the JOA. Maneuver sustainment is critical to the success of combat operations.

(g) Sustainment units and centers monitor consumption and status of units and push tailored packages directly to consumers. This responsive replenishment and repair logistical network maintains the smallest feasible deployed logistical footprint, leveraging the theater and global logistics C2 structures. Additionally, sustainment units conduct the required terminal



operations at key logistical nodes (SPODs, APODs, rail heads) used for sustainment of the force (including reception, staging, onward movement, and integration operations).

(h) Signal units and centers maintain and monitor the communications networks, providing the global C2 structures and ensuring delivery of critical information between combat, maneuver support, and sustainment forces at all levels of command. Additionally, signal units provide the interface to JIM elements.

(i) EW operations conducted during each phase of the JTF operation also provide support to maneuver support and sustainment operations (EW enablers such as MI units and intelligence regiments are not included in this section, but their support continues throughout all phases). Some key EW systems and operations that enable maneuver support and sustainment include:

- Airborne, mounted, and dismounted EA systems provide protection of maneuver support and sustainment forces and equipment against RCIEDs, and anti and counter-jamming systems. (Ground and manned EA systems for targeting high value targets are addressed in paragraph 2-8c(4), Decisive Maneuver.)
- Networked (includes strategic to tactical levels) airborne and ground based ES systems support the tracking of small and widely dispersed threat forces and provide indications and warning to maneuver support and sustainment forces to assist them in route determination and convoy planning.
- Airborne EA systems conduct area and point to point sweeps of the LOCs in support of pre-detonation operations against RCIEDs and other electronically initiated mines.
- EW enabled aircraft survivability equipment (ASE) provides protection of aviation sustainment platforms; countering and providing warning against the adversary's use of IR, EO, lasers, and EM jamming systems.
- Airborne and mounted HPM systems provide assistance in crowd control and can be used to shepherd hostile crowds and insurgents undermining sustainment operations.
- Situational awareness is improved through the interception, detection, identification and location of adversary radiated EM energy. This information can be used to effectively plan and execute EW missions against the adversary to assist friendly sustainment forces in reaching their destination.
- EP capabilities support 'assured communications' for maneuver support and sustainment forces through electronic equipment hardening against both friendly and enemy EA; management of the EMS, including frequency deconfliction; and the implementation of EMCON procedures.
- EWCC operations and the EW officers at each echelon provide support of maneuver support and sustainment forces through the continuous coordination, synchronization, and integration of EW capabilities within the JOA.

(7) *Network-enabled battle command.* Network-enabled battle command is the keystone of future Modular Force operations (see fig 2-13). Battle command is an art with the commander at the focal point of decision-making and execution of combat operations. Command requires an integrated view of the OE that combines knowledge of self, knowledge of the environment, and knowledge of the enemy in order to plan, decide, and execute future Modular Force operations.

The network provides the critical infrastructure that ties all components of the JIM force together. It allows ready access and sharing of information from and between national, component, and multinational partners.

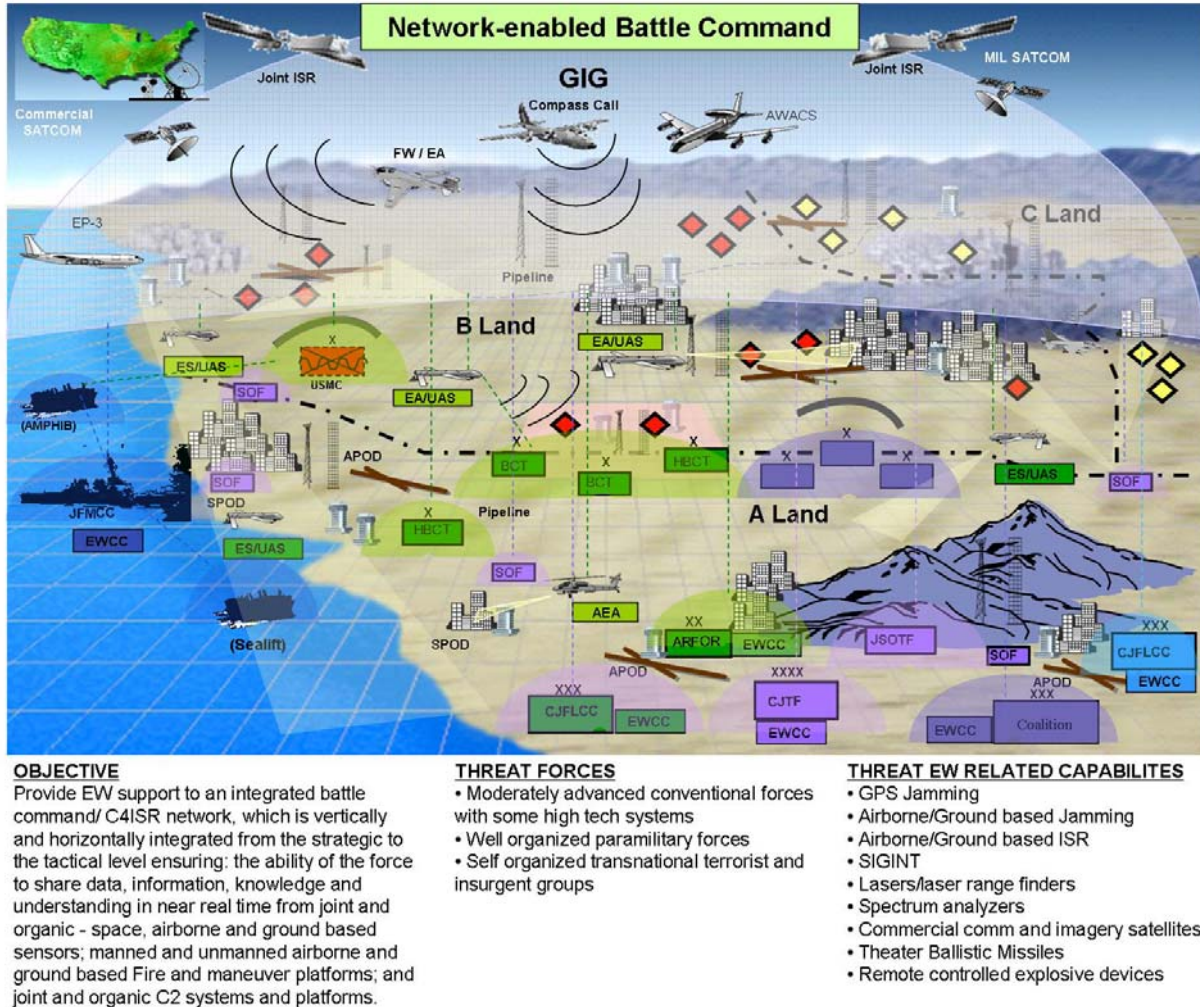


Figure 2-13. Network-Enabled Battle Command

(a) More than any other single entity, network-enabled battle command is the life blood of the future Modular Force. The network expands as the forces flow into the JOA and enables both inter- and intratheater communications. The network allows commanders to draw from other commanders, joint resources, and home stations, in addition to live and virtual staff support. To enable this ubiquitous future Modular Force network, a layering of platforms, sensors, processors, and relays is required. The joint force commander will expand the existing strategic network with operationally responsive space based assets and airborne C2 and ISR platforms. These assets augmented by organic resources within the future Modular Force enable the previously described seven key ideas and support the planning and execution of operations.

(b) To achieve the goal of networked-enabled battle command, the network must be protected from friendly interference and adversarial attempts to disrupt or deny its use to the force. The ability to protect battle command personnel, equipment and facilities against an adversary's attack is therefore critical to bringing the idea of network-enabled battle command to fruition. Along with computer network defense operations, operationally responsive EW assets are key enablers in support of this effort. As CJFLCC forces flow into the JOA, the networks, and the demands on the networks continue to grow. With this network growth, the ability to enable the electronic systems (that make up the network) to effectively perform their functions becomes critical. Proper management of the EMS through spectrum operations will protect enable the network to operate effectively, and mitigate interference caused by both friendly and adversary systems. Joint and organic spectrum management tools and applications assist the CJFLCC in this effort. EP assists in this effort, by ensuring C2 and ISR systems hardened from the effects of friendly and enemy EA, and the coordination and implementation of EMCON procedures. These active and passive EP means, along with EA actions against enemy EW assets, help to enable the effective C2 of operations such as: shaping and entry; operational maneuver; decisive maneuver; stability; and maneuver support and sustainment.

(c) EW systems and operations that are key components of network-enabled battle command include-

- National and joint space based platforms, and non-space based capabilities. This includes the full complement of EW and ISR systems.
- Joint and organic airborne and ground based (both manned and unmanned) ES sensors.
- EW systems able to deny, disrupt, degrade, or destroy network threats and sources of interference.
- Spectrum management and frequency deconfliction systems and applications.
- Networked EW systems from strategic to tactical level, capable of being retasked and reprogrammed vial data-link.
- Direct downlink of EW information to support current operations and timed EW COP updates.
- Threat warning and threat recognition systems.
- Rapid reprogramming of EW systems.
- EW systems able to identify and locate radiated EME in support of planning and targeting, current and future operations.

## **2-9. EW support to IO and the Warfighting Functions**

a. Although applicable across the full spectrum of operations, EW offers substantial operational benefits to IO. The *IO Roadmap* signed by the Secretary of Defense defined IO as, "the integrated employment of the core capabilities of EW, CNO, PSYOP, MILDEC, and OPSEC, in concert with specified supporting and related capabilities, to influence, disrupt, and corrupt or usurp adversarial human and automated decision-making while protecting our own." EW may enable, support, or enhance the other IO capabilities of CNO, PSYOP, MILDEC, and OPSEC. Computer network defense is a core capability of computer network operations to protect, monitor, analyze, detect, and respond to unauthorized DOD information systems and

computer networks. Within the U.S. Army, the signal regiment has responsibility for computer network defense.

b. The future Modular Force will execute IO through five major tasks: MILDEC, OPSEC, command and control warfare (C2W), information protection, and information engagement. To effectively support these tasks, EW must be integrated and synchronized with the other IO core, supporting and related capabilities within the operations process. EW capabilities offer a plethora of opportunities to support the five IO tasks, however, coordination amongst the cells supporting the IO tasks and the EW coordination cell is required to fully exploit them. For instance, enemy radio and television stations can be disrupted or replaced with friendly radio and television messages as part of a larger PSYOP mission in support of information engagement; electronic deception capabilities can support and enhance the overall MILDEC operation; and lethal and nonlethal EA can be used to deny, disrupt, or destroy enemy C2 systems and facilities in support of C2W. As dependency upon wireless networks continues to increase, it is imperative the EW capabilities be fully integrated with CNO (computer network attack/computer network exploitation/computer network defense) efforts to assist in network attack, exploitation and defense operations.

c. EW as a core capability of IO, will require that the future Modular Force commanders integrate selected EW capabilities in support of the five IO task requirements, as well as ensure that the entirety of EW capabilities are available to support Army operations across the six warfighting function's.

d. The following define each of the warfighting functions and articulate how EW capabilities can be used to support them:

(1) *The intelligence* warfighting function is the related tasks and systems that facilitate understanding of the enemy, terrain, weather, and civil considerations. It includes tasks associated with ISR. It is a flexible, adjustable architecture of procedures, personnel, organizations, and equipment. These provide relevant information and products relating to the threat, civil populace, and environment to commanders. The intelligence warfighting function focuses on four primary tasks; support to SU, support to strategic responsiveness, conduct ISR, and provide intelligence support to targeting. The Army concept most applicable to the intelligence warfighting function is the functional concept of *See*.

(a) EW capabilities support the *intelligence* warfighting function by increasing access for intelligence collection assets (both systems and personnel), through the disruption of enemy integrated air defense systems by radar/communication jamming; IR countermeasures supporting airborne SIGINT collection; and EA systems (such as CREW) which allow movement of intelligence operatives on the ground in areas where RCIED may be a threat.

(b) EW capabilities are also integral to enabling awareness of the OE. Advances in technologies will provide the Army with opportunities to leverage EW capabilities to allow a closer linkage between battlefield sensing (from platforms, drones, or forces) and the execution of offensive fires (lethal and nonlethal). Enabling platforms and payloads that previously only performed ISR, will additionally perform EA missions such as communications and radar

jamming, and denial of service operations. In addition, organic radar warning receivers and EW systems on tactical platforms can be networked to aid intelligence collection via data links. There are and will always be operational tensions between when to "jam" versus "collect." However, taking advantage of the dual use nature of EW systems (EA and ES) will continue to create opportunities that may dramatically shorten the Army's observe, orient, decide, and act loop while disrupting the adversary's observe, orient, decide, and act loop.

(2) *The movement and maneuver* warfighting function is the related tasks and systems that move forces to achieve a position of advantage in relation to the enemy. It includes those tasks associated with employing forces in combination with direct fire or fire potential (maneuver); force projection (movement); mobility; and countermobility. Movement and maneuver are the means by which commanders mass the effects of combat power to achieve surprise, shock, momentum, and dominance. The Army concepts most applicable to the movement and maneuver warfighting function are the two operating concepts of *Operational Maneuver* and *Tactical Maneuver* and the functional concept of *Move*.

(a) The ability to move forces to (intertheater) or within (intratheater) the AO requires a variety of actions, often performed under contested conditions. Army future combat forces must be able to quickly move strategic distances and enter directly into the theater of operations. Supporting EW capabilities will be a key enabler for Army forces' to quickly gain the initiative and swiftly defeat an opposing force. Prior to and during transit, EW forces must effectively deal with short lead times, long travel distances, minimal infrastructure (for example, few adequate ports or airfields, limited host nation support) at intermediate staging locations, and forcible entry into the AO. For these reasons, future EW systems must be modular so they can be quickly tailored to meet a wide range of contingencies. They must also possess the requisite intelligence support to achieve the desired effects.

(b) EW capabilities in support of movement include EW capabilities to: suppress enemy air defenses; destroy enemy air defenses; counterbattery fires; provide laser target designation/range finding; position and navigation enhancements; and provide lethal/nonlethal effects on enemy personnel, equipment and facilities. During maneuver operations, EW capabilities include: countering enemy EW effects against friendly personnel, equipment and facilities; countering RCIED, anti and counter-jamming systems, ASE; and protection from friendly EW effects. To effectively employ EW capabilities in support of movement and maneuver operations, there must be sufficient ES capabilities employed. ES capabilities to collect, intercept, identify and locate radiated EME and provide threat warning and direction finding, are required to ensure the future Modular Force can maneuver to positions of advantage undetected or unimpeded by the enemy. EP capabilities can ensure that maneuver forces and their systems are not impacted by friendly or enemy EA systems through the management of the spectrum; equipment hardening and emissions control procedures.

(3) The *fires* warfighting function is the related tasks and systems that provide collective and coordinated Army indirect fires, joint fires, and C2W through the targeting process. It involves integrating these capabilities into the CONOPS during planning. The fires warfighting function includes: deciding surface targets; detecting and locating surface targets;

delivering/employing; assessing effectiveness of fires; and integrating C2W. The Army concept most applicable to the fires warfighting function is the functional concept of *Strike*.

(a) EW supports the fires warfighting function and *Strike* functional concept through EA and ES capabilities. In addition to the EA fires mentioned in support of the maneuver function, EA capabilities can include pulsed energy effects such as HPM weapons to impact hard and deeply buried targets and WMDs; and similar capabilities can be used attack power generation and infrastructure targets. The option to use lethal or nonlethal EA fires provides the future Modular Force with enhanced flexibility in weapon/target matching, and will allow them to better engage targets constrained by collateral damage concerns.

(b) ES capabilities support the fires warfighting function and *Strike* functional concept, through the tasking of ISR assets to collect, intercept, identify, and locate sources radiating EME. This information can then be used for threat recognition; planning; and targeting for the conduct of EA fires in support of operations.

(4) The *protection* warfighting function is the related tasks and systems that preserve the force so the commander can apply maximum combat power. Preserving the force includes protecting personnel (combatant and noncombatant), physical assets, and information of the U.S. and multinational partners. It includes the following task areas: safety; fratricide avoidance; survivability; AMD; antiterrorism, counterproliferation, and consequence management actions associated with chemical, biological, radiological, nuclear, and high-yield explosive weapons; information protection; and casualty avoidance. Protection is composed of a variety of active and passive measures (such as, weapons, armor, camouflage, stealth, preemption, deception, and obscurity) in the air, land, sea, space, and cyberspace domains. Protection must be proactive, focused, and conducted by integrating military and cross government capabilities against our adversaries.

(a) EW supports the protection warfighting function and the *Protect* functional concept through the application of EA capabilities. These capabilities can counter RCIED, attack or disrupt enemy air defense systems, enhance ASE, and deceive enemy forces. Nonlethal EA can also offer force protection opportunities in the areas of crowd and vehicular control and threat discrimination.

(b) ES plays a critical role in the protection effort through actions taken to intercept, detect, identify, and locate or localize adversary EM emissions; which provide indications and warnings and direction finding information used to protect the force from potential threats. ES actions also provide the targeting and planning intelligence required to effectively employ EA capabilities.

(c) EP capabilities protect friendly personnel, equipment, and facilities from the effects of EA (both friendly and enemy) through EM hardening of equipment, spectrum management and deconfliction, and through the use of EMCON measures. All Army weapons systems should incorporate EW measures to insure they can remain effective in the face of adversarial EW. In addition, proper EP measures and capabilities can prevent enemy detection and targeting of friendly forces via SIGINT/ES means. EP should not be confused with force protection. EP

includes the active and passive means taken to protect against the effects of friendly or enemy employment of EW. EW can provide capabilities in support of force protection, but these capabilities are EA related capabilities (achieved through offensive or defensive EA actions).

(5) The *sustainment* warfighting function is the related tasks and systems that provide support and services to ensure freedom of action, extend operational reach, and prolong endurance. It includes those tasks associated with maintenance, transportation, supply, field services, human resources support, financial management, force health service support, religious support, distribution management, contracting, legal support; band support; and related general engineering. Sustainment facilitates uninterrupted operations through means of adequate logistic support. It is accomplished through supply systems, maintenance, and other services that ensure continuous support throughout an operation.

(a) Sustainment of friendly forces and equipment is critical in all phases of military operations. EW capabilities support the sustainment warfighting function and *Sustain* functional concept, through the application of EW to protect friendly sustainment forces, equipment and facilities. Whether static or mobile, EW capabilities can be used to protect sustainment forces from the adversary's use of EW. In a static environment, EP capabilities provide support to sustainment forces through the proper management and deconfliction of the EMS and through the implementation of emissions control procedures. Both are key enablers to the effective C2 of sustainment forces. In a mobile environment (convoys), EA capabilities can protect sustainment force from RCIEDs and can prevent the enemy from detecting the force's whereabouts.

(b) Critical to the protection of sustainment forces are ES capabilities to enhance EME SA through the interception, detection, identification, and location of adversary EM emissions and by providing indications and warnings. This information can be used to assist in asset tracking, convoy planning, and for targeting against potential threats to friendly sustainment forces.

(6) The C2 warfighting function is the related tasks and systems that support commanders in exercising authority and direction. It includes those tasks associated with acquiring friendly information, managing relevant information, and directing and leading subordinates. Through C2, commanders initiate and integrate all warfighting functions toward mission accomplishment. The C2 warfighting function focuses on five primary tasks: conduct command post operations; execute the operations process; integrate the information superiority contributors, that is, ISR, information management, IO and related capabilities; conduct civil-military operations; and execute command programs. Although each warfighting function uses information and information related activities to enhance combat power and attain operational advantages, it is the C2 warfighting function that is the primary integrator of information and information related activities associated with information superiority. Army leaders use information and information related activities to increase their SU before and during engagements while simultaneously degrading the enemy's ability to do the same.

(a) EW capabilities will provide defenses against enemy EA attacks to joint and Army force C2 nodes. EW supports the C2 warfighting function and the *Battle Command* functional concept through the application of EA and EP to: protect critical C2 nodes, personnel, systems,

and facilities from the effects of friendly and adversary EW operations; and to provide EW frequency deconfliction and rapid reprogramming of EW systems.

(b) The networking of organic and nonorganic EW systems will also facilitate an improved COP picture leading to a shortened decision cycle for future Modular Force commanders. In addition, EW C2 capabilities will enhance the required coordination between Army EA and joint-force C2 operations (critical to joint, Army, and allied data links and communications) to ensure joint and Army forces are not impacted by EA.

## **2-10. Summary**

a. The ability to dominate the EMS is central to achieving the full spectrum dominance envisioned in the joint and Army concepts. However, any attempt to dominate the EMS will be a monumental undertaking, and its success will greatly depend upon the integrated efforts of National, joint, and Service capabilities.

b. At the strategic and operational levels, the future Modular Force will rely heavily upon echelons above National, joint and corps EW capabilities to support the overall EMS dominance effort; however, the future Modular Force requires capabilities that will allow them to operate freely across the EMS, while controlling adversarial use of the spectrum. These capabilities when applied across the warfighting functions in support of FSO will enable the future Modular Force to address the broadening set of EW targets and maintain EMS dominance within the force's OE.

## **Chapter 3 Required Capabilities**

### **3-1. Introduction**

a. The relationship between the fundamental physics of EM wave propagation, anticipated threats, and the ground combat environment drives land component commanders to require capabilities, to include systems and families of systems, that are in some cases inherently different than those employed by other services. There are many factors that drive land component forces to particular EW capability requirements. Some of those include-

- Availability, persistency, and accessibility of National, joint, and coalition EW assets.
- Proximity of friendly and enemy forces.
- Anticipated enemy TTP.
- Current and future threat EW systems that affect ground forces.
- Anticipated terrain and combat conditions.
- Anticipated impact on friendly combat and noncombatant forces.
- Commercial and military technology maturity, availability, and cost.
- Fundamental physics of EM wave propagation.
- Natural phenomena affecting the EMS.
- Consumption of the EMS by friendly, enemy, and noncombatants.



- Size, weight, and power considerations relative to mobile ground-based equipment, this applies in particular to ground-based EA capabilities.

b. The Army's operating and functional concepts provide both explicit and implicit descriptions of EW enabling capabilities necessary to achieve the objective state of the future Modular Force. Not all of these capabilities are ends unto themselves but are integral components of larger capability goals. The influence of a single EW enabling capability is not necessarily confined to any single operating or functional concept and often enables or affects one or more of them. The Army EW required capabilities listing is presented in relationship to the Army's six functional concepts. It is through these six functional concepts that the EW enabling capabilities support the Army's capstone and operating concepts. The listing is not all inclusive and will be further refined and developed as the Army EW CBA process and the Joint Capabilities Integration Development System analysis is executed. Technological and threat advances may also drive changes to the listed EW related capability requirements.

### 3-2. Battle Command EW Enabled Capabilities

a. The *Battle Command* functional concept provides a visualization of how Army future Modular Force commanders will exercise C2 of Army operations in a JIM environment. The battle command function is a blend of the cognitive and the technical. Central to the technical component is the concept of a single, integrated ABCS enabled by an agile, ubiquitous communications network. It is achieved by combining the art of well prepared leaders with the enabling science and technical systems of the future Modular Force. Many of the key ideas within the *Battle Command* functional concept relate to or are enabled by EW systems. These key ideas include-

- Centrality of the commander.
- Role of the commander: framing, planning, preparing, executing, assessing, and reframing operations.
- Mission command.
- Self-synchronizing forces.
- Collaborative planning and accelerated and streamlined military decision making process.
- Decision superiority: central, critical role of high SA, shared SA, SU, and the COP.
- Continuous battle assessment, incremental adjustment to operations during execution.
- Adaptive C2 processes and structures, expanding span of control, and virtual staff.
- Single, integrated ABCS, joint capable at lower levels.
- The network.
- JIM interoperability and integration.
- Horizontal and vertical fusion.
- Ubiquitous, redundant, continuous communications network.

b. Although full achievement of the capabilities described in chapter 5, capabilities for the future Modular Force of the *Battle Command* functional concept will require the integration of a wide range of DOTMLPF solutions, the following EW capabilities may contribute to achieving the capabilities described in the *Battle Command* functional concept.

- (1) Ability to plan EW related operations including but not limited to synchronizing, coordinating, analyzing, advising, and integrating EW into operations.
- (2) Ability to control the execution of EW systems and operations including but not limited to COP updates, information management and dissemination, EMS monitoring, EW reprogramming, and asset management.
- (3) Ability to assess EW related operations (friendly and adversary).
- (4) Ability to dynamically manage the EMS. For example, the ability to dynamically assign and re-assign spectrum frequencies during missions.
- (5) Ability to adjust EW capabilities during mission execution via the GIG. For example, the ability to update the threat loads in EA systems.
- (6) Ability to provide an enhanced, fully networked, EW threat warning and direction finding.
- (7) Ability to provide on demand access to ES data, EW asset availability, and EW threat warning information in all OEs and conditions.
- (8) Ability to rapidly reprogram EW systems.
- (9) Ability to provide EW system “part task trainers,” simulations, and models.
- (10) Ability to rapidly upgrade/update EW capabilities to keep up with commercial technologies that can be used against friendly capabilities.

### **3-3. See EW Enabled Capabilities**

a. The *See* functional concept describes how the future Modular Force will acquire and generate knowledge of itself, its opponent and the OE. Without the ability to see, the Army is incapable of creating a force capable of seeing first, understanding first, acting first, and finishing decisively. The key ideas within the *See* functional concept are the acquisition, transformation, delivery and exploitation of data and information that will assist the future Modular Force commander in achieving decision superiority:

- *Acquire*: Acquisition of data from organic and nonorganic sources.
- *Transform*: Rapid and continuous fusion of data and analysis of information.
- *Provide*: Timely, geo-spatially precise, accurate, assured, and tailored knowledge input to the commander and other leaders for decision making, force application, movement, protection and sustainment.
- *Data exploitation*: Ability to find, process, and relate data in extremely large databases.

b. Although full achievement of the capabilities described in chapter 5, capabilities for the future Modular Force, of the *See* functional concept will require the integration of a wide range of DOTMLPF solutions, the following EW enabling capabilities may contribute to achieving the capabilities described in the *See* functional concept:

(1) Ability to detect, acquire, transform, and exploit radiated EME data from organic and nonorganic (both manned and unmanned), space-based, high altitude, airborne and ground based sensors, sources, and repositories.

(2) Ability to cross-link and down-link ES data from organic and nonorganic (both manned and unmanned) space-based, high altitude, airborne and ground based sensors.

(3) Ability to store, update, and transfer electronic data base information.

(4) Ability to rapidly identify and locate friendly and enemy and neutral sources of radiated energy.

(5) Ability to rapidly assess EM interference effects to friendly systems and determine if it is the result of friendly or enemy action.

(6) Ability to exploit national and strategic EW systems for tactical needs.

(7) Ability to rapidly transfer targetable data received from EW warning systems to strike platforms.

(8) Ability to rapidly survey and recon targets for EW exploitation.

(9) Ability to quickly determine intelligence gain or loss.

### **3-4. Strike EW Enabled Capabilities**

a. The *Strike* functional concept describes how the future Modular Force during 2015-2024 will employ fires, including available joint and multinational fires, in support of FSO and will integrate fires with elements of IO and other nonlethal capabilities across the full ROMO. The concept articulates the following key ideas and associated enablers.

(1) Provide continuous integration and employment of networked strike from strategic to tactical levels by:

- Providing collaborative, dynamic planning and employment across all levels of command.
- Ensuring continuous access to the COP.
- Establishing seamless and transparent communications and computer interface.
- Ensuring routine employment of available joint and multi-national fires.
- Ensuring means to network sensors to achieve cooperative, responsive engagement of targets.

- Establishing network imbedded precision target location capability recognized by joint and interagency.
- Ensuring fully automated fusion of sensor data in order to recognize, classify, identify, and locate targets with precision.
- Classifying, tracking, and maintaining SA of all friendly, enemy, and neutrals, both personnel and objects, and effect 100% combat identification.
- Providing pervasive SA of all OE objects.
- Establishing real time integration of surface, subsurface, air, and near space-based fires with air, surface, subsurface, and near space OE objects.

(2) Provide seamless integration of lethal and nonlethal fires by:

- Achieving synergy of fires with information capabilities and operations.
- Expanding nonlethal means and capabilities.
- Employing advanced antipersonnel, antimateriel, and terrain denial capabilities.
- Understanding the implications of actions and provide consequence management.
- Synthesizing large quantities of disparate information that facilitate full integrated employment of lethal and nonlethal COAs.
- Understanding the implications of the human dimension on the application of lethal and nonlethal effects.
- Employing the use of a standard effects generation tool consistent across joint forces.
- Altering munitions effects from lethal to nonlethal and vice versa after firing/launch.

(3) Attack all target types in all environments and terrains with unprecedented effectiveness by:

- Employing advanced munitions.
- Achieving near-real time SA.
- Integrating and employing systems that mitigate or eliminate consequences of target posture and the response gaps of sensors, shooters, and networks.
- Delivering near-immediate, precision and sustained fires.
- Accomplishing optimum balance of lethality overmatch within collateral damage constraints.
- Providing point and area precision fires at every echelon (includes strategic to individual soldier levels). This bullet was added to provide focus and clarity on EW, and is not part of the original key enablers in the *Strike Functional Concept*.
- Employing sensors that can accurately locate and identify, in real time, concealed or disguised objects in all natural and man-made environments.
- Establishing continuous access to sensor information from strategic to tactical levels.
- Employing real time, interactive munitions capable of scalable effects that can be adjusted based upon changing conditions.

- Applying the most advantageous mix of sensors and those personnel can bring about an effect to a specific target.
- Teaming ES/EA and SIGINT experts and capabilities with maneuver forces. This bullet was added to provide focus and clarity on EW, and is not part of the original key enablers in the *Strike Functional Concept*.

(4) Maintain routine access to space capabilities by:

- Incorporating space-related interagency capabilities.
- Introducing operational responsive space as the new model for space access.
- Providing space capabilities to and throughout all levels of command.

(5) Guarantee responsiveness and scaled lethality through joint interdependence by:

- Identifying requirements for reciprocal joint support of lethal and nonlethal strike.
- Establishing a fully interoperable and seamless fires network at all levels.
- Establishing a single, common capability for target location and engagement (spot, mark, tag, designate).
- Implementing a common set of procedures and control measures.
- Developing reciprocal visibility and access to assets and capabilities.
- Establishing a common grid reference system.
- Establishing standardized certification, education, and training for joint fires.
- Implementing common waveform communications across the OE.
- Establishing and implementing a common suite of joint decision making tools.
- Assess intelligence gain/loss. This bullet was added to provide focus and clarity on EW, and is not part of the original key enablers in the *Strike Functional Concept*.

b. Although full achievement of the capabilities described in chapter 5, capabilities for the future Modular Force, of the *Strike* functional concept will require the integration of a wide range of DOTMLPF solutions, the following EW capabilities may contribute to achieving the key ideas and associated enablers described in the *Strike* functional concept.

(1) Ability to plan, synchronize, coordinate, and integrate EA into strike operations.

(2) Ability to integrate non organic EW assets in support of strike operations.

(3) Ability to employ EA to disrupt, degrade and/or destroy adversary (includes targets with precision strike requirements such as minimal collateral damage and/or minimal weapons signature).

(4) Ability to employ EA to control, disperse or neutralize combatant and noncombatant personnel with nonpersistent effects and minimum collateral damage (scalable/nonlethal).

(5) Ability to employ EA in an area denial role against vehicles, vessels and aircraft.

- (6) Ability to employ EA to defeat rockets, artillery, mortars, and missiles inflight.
- (7) Ability to dynamically task and re-task space based and unmanned aerial EW systems in support of strike operations.
- (8) Ability to leverage space control capabilities against enemy C2 and EW weapon systems and space-based ES to detect, locate and identify enemy radiated EME in support of strike operations.
- (9) Ability to provide improved real-time or near-real-time space based ES with on-board sensor processing and direct down link to supported ground systems.
- (10) Ability to use EW strike assets to deny, disrupt, or degrade adversary access to space-based systems.
- (11) Ability to disrupt, deceive, degrade and/or destroy enemy EMS-reliant sensors (to include SIGINT/ES, electronic-optical-infrared, and radar).
- (12) Ability to detect, identify/classify, locate, deny, degrade/disrupt, deceive, control, and/or destroy enemy information and information systems (such as, data, voice).
- (13) Ability to rapidly assess intelligence gain/loss of targets.

### **3-5. Protect EW Enabled Capabilities**

a. The *Protect* functional concept describes how the future Modular Force will protect people, physical assets and information against the full spectrum of threats. This concept also explicitly describes the function of protect as applying to people, assets and information, and having both an organic active protection piece and an interdependency with joint protection capabilities. Each of the five enabling tasks contained in the *Protect* concept: detect, assess, decide, act and recover enhanced by EW enabling capabilities.

b. Although full achievement of the capabilities described in chapter 5, capabilities for the future Modular Force, of the *Protect* functional concept will require the integration of a wide range of DOTMLPF solutions, the following EW enabling capabilities may contribute to the capabilities described in the *Protect* functional concept.

- (1) Ability to provide active and passive protection options. For example, the use of EA to deter/neutralize/destroy on-going hostile attacks or the hardening of equipment against radiated EME.
- (2) Ability to provide protection from enemy EW threats to airborne platforms (EO, IR, RF, and DE counters).
- (3) Ability to provide persistent threat warning to maneuvering forces.

(4) Ability to provide protection for personnel and equipment from enemy EW threats (counter-RCIED or pre-detonation of IEDs).

(5) Ability to prevent detection, location, and tracking of friendly forces by enemy SIGINT and ES systems and organizations.

(6) Ability to protect information, (data, and voice) from adverse effects of EW and EW enabled systems (fratricide or adversary ability to detect, identify, classify, track, locate, deny, degrade, disrupt, deceive, control, and/or destroy).

### **3-6. Move EW Enabled Capabilities**

a. The *Move* functional concept focuses on strategic force projection and operational agility in support of joint campaign objectives. The key ideas articulated within the *Move* functional concept are:

- Strategic responsiveness through a “prompt and sustained framework.”
- Prompt response—with units prepared for immediate deployment.
- Sustained response and operational agility—exploiting multiple entry points and simultaneous force flows by air and sea and ground.
- Tactical movement and mobility—projection of forces throughout the JOA.
- Relevance across the ROMO.

b. Whether the operational conditions for force projection require a prompt response or lead to sustained combat operations, the one thing both conditions have in common are that they will be heavily reliant on accurate SU, reach, and the ability to execute en route mission planning and rehearsal to be successful.

c. Although full achievement of the capabilities described in chapter 5, capabilities for the future Modular Force, of the *Move* functional concept will require the integration of a wide range of DOTMLPF solutions, the following EW enabling capabilities may contribute to achieving the capabilities described in the *Move* functional concept.

(1) Ability to negate the enemy’s ability to detect, identify, locate, and track forces during movement and maneuver.

(2) Ability to provide tactically responsive, long endurance EW capable platforms to locate and counter EW related anti-access threats.

### **3-7. Sustain EW Enabled Capabilities**

a. The *Sustain* functional concept articulates how future Modular Force logistics will enable Army forces to execute simultaneous, distributed operations within a noncontiguous battlefield, as envisioned in the Army capstone concept. It describes how distributed support and sustainment are the keys to maintaining freedom of action, while using the smallest logistic

footprint feasible. These distributed support and sustainment ideas, challenge Army concepts that depend upon infrastructure and secure ground LOC for distribution and sustainment.

b. The sustain function describes the need for a decrease in the dependency on ground LOCs and an increase in the reliance on air and sea based delivery platforms and reach back. It illustrates how future Modular Force sustainment will maximize direct delivery of tailored packages at the tactical level, and how this distribution will be complemented by demand reduction resulting from improved unit self-sustainment, and increased parts commonality. A major enabler to this distribution and sustainment framework is the network-enabled logistics system, which is heavily dependent on systems that operate within the EMS. The key ideas articulated within the *Sustain* functional concept are as follows:

- A single joint capable network-enabled logistics system.
- High-speed, precision, accuracy, visibility, and centralized supply chain management with minimum essential forward stockage and reach back capabilities.
- Interdependent, capabilities based, modular, network-enabled organizations with increased commonality of equipment and organizational designs.
- Highly mobile systems, advanced distribution platforms, precision delivery systems and state-of-the-art C2.
- Continuous support through global integrated management and sourcing of joint, Army, and combined partnerships.

c. Although full achievement of the capabilities described in chapter 5, capabilities for the future Modular Force, of the *Sustain* functional concept will require the integration of a wide range of DOTMLPF solutions, the following EW enabling capabilities may contribute to achieving the capabilities described in the *Sustain* functional concept.

(1) Ability to provide persistent threat warning to sustainment and maneuver support forces from operationally responsive joint and organic EW assets.

(2) Ability to detect, destroy or neutralize enemy emplaced mines at standoff distances.

(3) Ability to negate the enemy's ability to detect, identify, locate, and track sustainment and maneuver support forces.

## **Chapter 4**

### **Bridging the Gap Between Current and Future EW Capabilities**

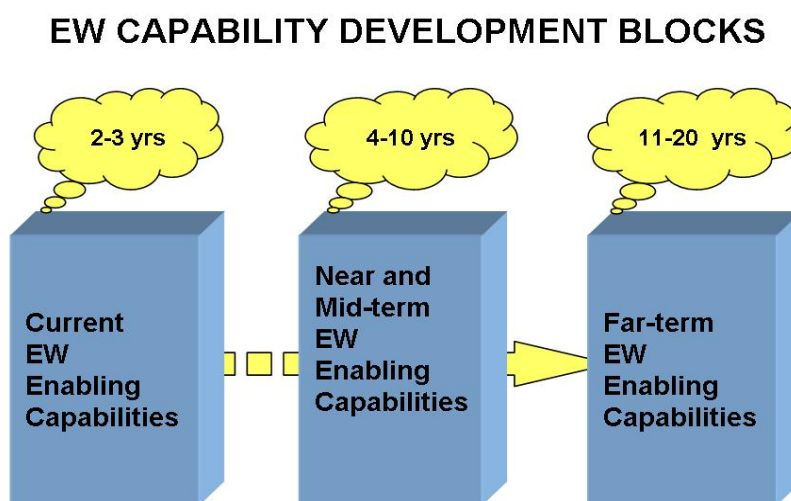
#### **4-1. Introduction**

a. This chapter identifies the EW enabling capabilities required by the future Modular Force and describes the systems that enable the achievement of those capabilities. In chapter 2 of this CCP, the Army's EW vision is stated as being 'underpinned by a layered infrastructure of DOTMLPF, which are critical to its successful achievement.' This infrastructure is evident in the enabling capabilities described. The description of the enabling capabilities is organized by



Army functional concept areas and is further divided into three capability areas titled: EA (both offensive and defensive), EP, and ES. Each of the capability development areas will be identified within blocks of time, which represents the incremental developments associated with achieving the future Modular Forces' required EW enabling capabilities (see fig 4-1).

b. Bridging the gap between current and future EW enabling capabilities is a complex task involving national agencies, the joint community, and numerous Army proponents. As such, the future capabilities described in this chapter, and the associated solution components, are crafted in a "best case" context. They represent the optimum EW enabling capabilities across the DOTMLPF domains for the timeframe, the threat, and the full ROMO. Many of the EW enabling capabilities identified in this chapter may also be addressed in other CCPs such as: the *Unit Protection CCP*; the *ISR CCP*; the *Space Operations CCP*, and the *EMS Operations CCP*.



**Figure 4-1. EW Capability Development Blocks**

#### 4-2. EW Attributes

a. As clearly articulated in USSTRATCOM's OCEW, any future EW capability able to effectively execute the tasks of a joint force command will possess certain attributes. These attributes will be consistent whether the EW capability is focused on denying or exploiting the enemy's use of the EMS; or ensuring friendly use of the EMS. Taken together, these attributes will help to define the concept of EW and will describe how capabilities will be developed by the services for the joint forces. The Army will use these attributes to help define the EW capabilities required to support land forces. Future land force EW capabilities should extend advantages that enable us to contend effectively with current and future challenges.

b. As the Army bridges the gap between current and future EW enabling capabilities, one of the most important efforts in this regard will be to sustain the key EW operational attributes of networked, interoperable, adaptable, tailorable, precise, resilient, agile, lethal, and nonlethal capabilities. The EW attributes are described below.

**Table 4-1  
EW Attributes**

<b>EW ATTRIBUTES</b>			
Networked	EW assets and functions incorporated across FSO via the GIG. EW connectivity will ensure no single point of failure. Connectivity will provide complete access to assigned specific missions via seamless information sharing and provide real time threat, target and effect information as defined by the user.	Scope of availability meets needs of the operational and tactical warfighters during all phases of military operations.	Extent to which real time targeting , effect of coordinated execution, and threat assessment meet command level intent.
Interoperable	Provides seamless operations with U.S. and friendly forces across the physical, virtual and human domains. Operations are continuous and real-time. Provides synchronized and integrated EA, ES, EP, with other disciplines of warfare. (See DODD 2010.6, Materiel Interoperability With Allies And Coalition Partners.)	Interchangeable, modular, and integrated throughout the land and joint force commander’s operation and will not hinder friendly forces and does not degrade friendly EMS dependent systems.	Cooperative EW engagements yield effects on targets that meet tasking and requirements.
Adaptable/ Tailorable	Systems are self-reliant and enable the user to tailor and scale capabilities to meet the environment.  EW can, in real time, meet changing requirements and generate a wide range of effects.	Flexible EW employment will allow users to meet challenges presented by modifications of the adversary’s TTP or environment.	Time required to reconfigure weapon systems, and adapt to target changes and the EM environment. Time required for organizational and operational changes to meet dynamic target environment and objectives.
Precise	Provides error free effects that deny unfriendly forces’ capabilities, while simultaneously ensuring friendly force use of the EMS.  Accuracy and precision performance are measured through the use of EA, EP, and ES and will not hinder friendly forces, or domestic and/or allied critical infrastructure.	Discriminate specific adversary targets from friendly and nonhostile commercial civilian assets.  Accurately discern targets (prevent damage to friendly or unintended targets).  EW asset achieves desired effect.	Parametric accuracy rate of both internal “organic EW” and external sources.  Percentage of correct weapon systems and only specified frequency or frequency range, target geo-location data, EMS technique, and parametric discrimination utilized for threat area.

**Table 4-1  
EW Attributes, continued**

<b>EW ATTRIBUTES, CONTINUED</b>			
Resilient	Capable of continuing operations despite combat or operational losses.  Networked EW systems with robust built in redundancies.	Operates independently in the event of GIG/Network connectivity disruption.  Ability to function in all environments and phases of conflict.	No single point of failure.
Agile	Achieves high range of shifting effects against diverse and different target sets using enduring and persistent actions.	System adaptability enables instantaneous effects tailored to capitalize on emerging opportunities.	Time and effort to affect tasking in near real time.  Percentage of effect on targets meets tasking.
Lethal	Capitalizes all EW attributes and aspects to dominate the EMS in all phases to military operations.  EW will destroy, control, or deny an adversary and/or his systems under all conditions and in any environment.	Damage assessment.	Capability Effectiveness rates.  Targeted people react as desired.  Targeted systems no longer operate as intended.
Nonlethal	Ability to create desired effects using nondestructive/nonfatal Capabilities.	Damage Assessment.  Degree of nondestructive affect(s).  Broaden range of effects.	Degree of incapacitation and effectiveness rates.  Extent effects facilitate post-hostility efforts.  Degree to which flexible solutions enable coordinated attacks and not diminish the ability to use lethal means to meet commander's intent and the threat environment.

**4-3. Assessment of Battle Command related EW Enabling Capabilities**

Battle command encompasses a commander's need to continually address changing situations and missions by dynamically linking functions within and across the JOE. This requires the employment of a robust set of systems, facilities, organizations and well trained Soldiers, who must be able to operate securely within the EMS. Table 4-2 depicts the current, mid term, and far term EW enabling capabilities which will enable the future Modular Force's battle command personnel, equipment, and facilities.

**Table 4-2  
Battle Command EW Enablers**

<b>BATTLE COMMAND ELECTRONIC WARFARE ENABLERS</b>			
<b>EW Enabling Capability Statements</b>	<b>Current</b>	<b>Near - Mid Term Migration</b>	<b>Far Term Migration</b>
<b>Ability to Plan EW related operations including but not limited to synchronizing (deconflicting), coordinating, analyzing, advising and integrating EW into operations.</b>	-Convoy planning tool -Spectrum analyzers -Electronic DBs - ABCS -Global Command and Control System Army (GCCS-A) -Coalition Joint Spectrum Management Planning Tool -Force XXI Battle Command, Brigade and Below (FBCB2) -FBCB2 – Air -Aviation Mission Planning System -Blue Force Tracking -Link 16/tactical digital link (TADIL-J)	-EW COP application -Command post of the future Joint Tactical Radio System (JTRS), Service Orientated Architecture System of systems common operating environment	-Global electromagnetic spectrum information system (GEMISIS) -FCS-Battle command -Warfighter information tactical (WIN-T) Network Management - Net-enabled command capability NECC -JTRS
<b>Ability to control the execution of EW systems and operations including but not limited to COP updates, information management and dissemination, EMS monitoring, EW reprogramming, and asset management.</b>	- GCCS-A -ABCS -FBCB2/FBCB2-Air -EW Reprogramming -Link 16/TADIL J	- System of systems common operating environment -EW COP Application -JTRS, Service Orientated Architecture -Command Post of the Future Command post of the future	-GEMISIS -FCS-BC -WIN-T Network Management -NECC - JTRS
<b>Ability to assess EW related operations (friendly and adversary).</b>	No current capability	- System of systems common operating environment	-GEMISIS -FCS-BC -DE Assessment Tools
<b>Ability to dynamically manage the EMS (that is, the ability to dynamically assign and re-assign spectrum frequencies during missions).</b>	-Coalition Joint Spectrum Management Planning Tool	-WIN-T Spectrum Management Tool. -RF De-confliction Application/Tool.	-GEMISIS
<b>Ability to adjust EW capabilities during mission execution via the GIG (that is, the ability to update the threat load in an EA system).</b>	-Manual reprogramming	-on demand reprogramming via TADIL - Automated geolocation and re-tasking.	-dynamic reprogramming via the GIG
<b>Ability to provide an enhanced, fully networked, EW threat warning and direction finding.</b>	-No current capability	-Networked EW threat warning and Direction Finding system	-FCS-BC
<b>Ability to provide on demand access to ES data, EW asset availability, and EW threat warning information in all OEs and conditions.</b>	-Link 16/TADIL J	-Networked EW DB (capable of auto updates by sensors via TADILs -Networked EW threat warning and Direction Finding system -Improved access to National databases (reach-back)	-GEMISIS - FCS-BC -DCGS-A
<b>Ability to provide EW system “Part Task Trainers”, simulations, and models.</b>	-CREW training systems	- RF Propagation modeling tools for both communications and RADAR. - EW systems Part Task Trainers	EW systems integration into simulations and models.

**4-4. Assessment of See related EW Enabling Capabilities**

The functional concept, *See*, focuses on the contribution of data acquisition, transformation of data into information and knowledge, and providing information and data to the future Modular Force. The continuous acquisition and synthesis of data and information from joint and interagency capabilities, coalition partners, and nontraditional sources permits the future Modular Force to maintain an accurate understanding of the OE. Table 4-3 depicts the current, mid term and far term EW enabling capabilities that support the *See* functional concept.

**Table 4-3  
See EW Enablers**

<b>SEE ELECTRONIC WARFARE ENABLERS</b>			
<b>EW Enabling Capability Statement</b>	<b>Current</b>	<b>Near - Mid Term Migration</b>	<b>Far Term Migration</b>
<b>Ability to detect, acquire, transform, and exploit radiated EME data - from organic and nonorganic (manned and unmanned), space-based, high altitude, airborne and ground based sensors, sources, and repositories.</b>	<ul style="list-style-type: none"> <li>-ELINT Systems</li> <li>-Measurement and signature intelligence systems</li> <li>-Tactical SIGINT Payload</li> <li>-GRCS (Guard Rail Common Sensor)</li> <li>-RF detection systems (APR 39A)+</li> <li>-Laser Detection Systems (AVR-2B)</li> <li>-AH-64D RFI, passive air defense detection</li> <li>-Spectrum Analyzers</li> <li>-Prophet/Prophet Triton</li> </ul>	<ul style="list-style-type: none"> <li>-Networked – Unattended EMS sensors.</li> <li>-Networked Unmanned Aerial and Ground Based EMS sensors.</li> <li>-Networked Automated ASE sensors.</li> <li>-Joint EW data link interface.</li> <li>-Improved RF, Laser, IR and EO detectors.</li> <li>-Longbow Millimeter Wave Fire Control Radar</li> <li>-Longbow Integrated ASE detection systems.</li> <li>-Aerial Common Sensor.</li> </ul>	<ul style="list-style-type: none"> <li>-Automated ASE-Sensors (capable of auto forwarding EMS data via the GIG</li> <li>-Automatic/Aided</li> <li>-Target Recognition, Detection and Classification</li> <li>-Advanced RF, IR, EO, and Laser detectors</li> <li>-FCS UAS (with SIGINT, DF and emitter mapping capability</li> <li>-Fire Control Radio Extended Range</li> <li>-Image Fusion (EO, Radar)</li> </ul>
<b>Ability to cross-link and down-link ES data from organic and nonorganic (manned and unmanned) space-based, high altitude, airborne and ground based sensors.</b>	<ul style="list-style-type: none"> <li>-Link 16/TADIL J</li> </ul>	<ul style="list-style-type: none"> <li>-Networked EW threat warning and Direction Finding system</li> <li>-Modular Force UAS (with SIGINT payload)</li> <li>-Improved access to National assets (space based systems)</li> </ul>	<ul style="list-style-type: none"> <li>-FCS UAS (with SIGINT, DF and emitter mapping capability)</li> <li>- high altitude and ground based sensors</li> <li>- Geo-location from multiple sensors (that is, radars, SIGINT)</li> </ul>
<b>Ability to store, update, and transfer electronic data base information.</b>	<ul style="list-style-type: none"> <li>Electronic Databases</li> </ul>	<ul style="list-style-type: none"> <li>-Networked EW DB</li> <li>-Improved access to National databases (reach-back)</li> <li>-DCGS-A</li> </ul>	<ul style="list-style-type: none"> <li>-FCS BC</li> </ul>
<b>Ability to rapidly identify and locate friendly and enemy and neutral sources of radiated energy.</b>	<ul style="list-style-type: none"> <li>-ELINT Systems</li> <li>- Measurement and signature intelligence systems</li> <li>-Tactical SIGINT Payload</li> <li>-GRCS (Guard Rail Common Sensor)</li> <li>-RF detection systems (APR 39A)</li> <li>-Laser Detection Systems (AVR-2B)</li> <li>-AH-64D RFI, passive air defense detection</li> <li>-Prophet/Prophet Triton</li> <li>-Spectrum Analyzers</li> </ul>	<ul style="list-style-type: none"> <li>-Networked – Unattended EMS sensors</li> <li>-Networked Unmanned Aerial and Ground Based EMS sensors</li> <li>-Joint EW data link interface</li> <li>-Improved access to National databases (reach-back)</li> </ul>	<ul style="list-style-type: none"> <li>-FCS UAS (with SIGINT, DF and emitter mapping capability).</li> <li>-RFI Passive Ranging</li> </ul>
<b>Ability to rapidly assess EM interference effects to friendly systems and determine if it is the result of friendly or enemy action.</b>	<ul style="list-style-type: none"> <li>-Spectrum Analyzers</li> </ul>	<ul style="list-style-type: none"> <li>-Improved access to National databases (reach-back)</li> </ul>	<ul style="list-style-type: none"> <li>-FCS UAS (with SIGINT, DF and emitter mapping capability)</li> </ul>
<b>Ability to exploit national and strategic EW systems for tactical needs.</b>	<ul style="list-style-type: none"> <li>-Link 16/TADIL J</li> </ul>	<ul style="list-style-type: none"> <li>-Improved access to National databases (reach-back).</li> </ul>	<ul style="list-style-type: none"> <li>-Linkage to national and strategic EW systems through FCS BC .</li> </ul>

**Table 4-3**  
**See EW Enablers, continued**

<b>SEE ELECTRONIC WARFARE ENABLERS, CONTINUED</b>			
Ability to rapidly transfer targetable data received from EW warning systems to strike platforms.	-Link 16/TADIL J	- Advanced Field Artillery Tactical Data System (AFATDS) with EW applications -DCGS-A	-FCS Battle Command System -FCS UAS (with SIGINT, DF and emitter mapping capability)
Ability to provide improved real-time or near-real-time space based ES with on-board sensor processing and direct down link to supported airborne and ground systems.	-National Classified Satellite Systems (National Technical Means) -GBS	-National Classified Satellite Systems (National Technical Means) -WGS -DCGS-A	-National Classified Satellite Systems (National Technical Means) -Next Generation Wideband Satellite System -TSAT -JC2/NECC -DCGS-A -High Altitude Long-loiter Systems
Ability to rapidly survey and recon targets for EW exploitation.	-UAS -FW ISR platforms -Prophet/Prophet Triton	-Networked Unmanned Aerial and Ground Based EMS sensors -Joint EW data link interface -Improved access to National databases (reach-back) -Tactical SIGINT survey capability	-FCS UAS (with SIGINT, DF and emitter mapping capability).

**4-5. Assessment of Strike related EW Enabling Capabilities**

The *Strike* functional concept focuses on future Modular Force networked fires and effects at strategic, operational and tactical levels, to include aviation interdiction attack. The *Strike* functional concept incorporates the effects of fires capabilities as well as effects achieved by other means such as EW, CNO, PSYOP, and MILDEC, plus other effects related to space based systems. Table 4-4 depicts the current, mid term and far term strike related EW enabling capabilities required by the future Modular Force.

**Table 4-4**  
**Strike EW Enablers**

<b>STRIKE ELECTRONIC WARFARE ENABLERS</b>			
<b>EW Enabling Capability Statement</b>	<b>Current</b>	<b>Near - Mid Term Migration</b>	<b>Far Term Migration</b>
Ability to plan, synchronize, coordinate and integrate EA into strike operations	-ABCS	-Command post of the future -AFATDS Nonlethal application	-FCS BC -EA Assessment Tools
Ability to integrate non organic EW assets in support of strike operations.	-ABCS	-Command post of the future -AFATDS Nonlethal application	-FCS BC
Ability to employ EA to disrupt, degrade and/or destroy adversary (including targets with precision strike requirements (no – to minimal collateral damage and minimal weapons signature).	-CREW system -Laser Designators -Antiradiation missiles -RF Jammer (ALQ-136) -IR Jammer (ALQ-144)	-Prophet EA -Unattended/Unmanned EA/Jammers -Mounted and Dismounted EA -Mounted and Dismounted DE -HPM weapons -CESAS -Advanced Antiradiation missiles -EW COP Application	-FCS UAS (with EA payload) -Airborne and ground based Laser weapon system -DE Weapons with scalable effects (nonlethal to lethal) -Suite of Integrated IR countermeasures (SIIRCM) (Directed IR Jamming) -Advance RF Jammers -RFI Passive Ranging

**Table 4-4  
Strike EW Enablers, continued**

<b>STRIKE ELECTRONIC WARFARE ENABLERS, CONTINUED</b>			
<b>Ability to employ EA to control, disperse or neutralize personnel/soft targets with nonpersistent effects and minimum collateral damage (scalable/nonlethal).</b>	No current capability	-Active Denial System (ADS)/ Millimeter wave nonlethal weapons. -Modular Force UAS with EA capability	-Airborne (manned and unmanned) Active Denial Systems (MMW). -Ground based Active Denial Systems (MMW).
<b>Ability to employ EA in an area denial role against vehicles, vessels and aircraft.</b>	No current capability	-Active Denial System (ADS)/ Millimeter wave nonlethal weapons.	-Airborne (manned and unmanned) Active Denial Systems (MMW). -Ground based Active Denial Systems (MMW).
<b>Ability to employ EA to defeat Rockets, Artillery, Mortars, and Missiles in flight.</b>	No current capability	Airborne lasers	-Airborne and ground based Laser weapon systems
<b>Ability to leverage space control capabilities in support of strike operations.</b>	Link 16/TADIL J	AFATDS (with nonlethal strike application)	FCS BC

**4-6. Assessment of Protect related EW Enabling Capabilities**

The *Protect* functional concept describes how the future Modular Force will protect people, physical assets, and information against the full spectrum of threats. EW enabling capabilities are key elements of the protect function and Table 4-5 depicts the current, mid term and far term protect related EW enablers required by the future Modular Force.

**Table 4-5  
Protect EW Enablers**

<b>PROTECT ELECTRONIC ATTACK ENABLERS</b>			
<b>EW Enabling Capability Statement</b>	<b>Current</b>	<b>Near - Mid Term Migration</b>	<b>Far Term Migration</b>
<b>Ability to provide protection for personnel and equipment from enemy EW threats (i.e. Jamming CM, C-RCIED, pre-detonation of mines).</b>	-CREW system -Chaff/Flare Dispenser (ICMD) -Common Missile Warning System (CMWS) -Laser Detection System (AVR-2B) -AH-64D RFI, passive air defense detection -Electronic masking -Convoy Planning Tool -Spectrum Analyzers -RF Detection Systems (APR-39A) -Radio Direction Finding (RDF) -EW Reprogramming -Limited hardening for electronic components -HERO testing to safeguard against stray RF energy activating munitions	-JCREW system -EA Counter Mine (pre-det) -Longbow Integrated ASE -EMCON Status Application/ Tool -EM Shielding -MMW Obscuration -Improved RFI (Radar Frequency Management) -EW COP Application -RF Detection Sys (APR-39X) -Advanced RF/IR Countermeasures (Chaff, Flares, Decoys) -EW Reprogramming via TADIL -Modular Forces UAS (with ECCM capability) -Advanced Radar Warning Receivers -Joint Tactical Radio System (Link 16) -Improved Hardening for electronic components -SIIRFC (Suite of Integrated IR Countermeasures)	-RFI Passive Ranging -Multi-Mode Laser -Advanced hardening for electronic components -FCS UAS hardened against DE, RF, high-altitude electromagnetic pulse and electromagnetic pulse -FCS UAS (with ECCM capabilities) -Automated ASE-Sensors (capable of auto forwarding EMS data to the COP via GIG). -SIRFC (Suite of Integrated RF Countermeasures) -Airborne Networking Waveform (ANW) -Advanced MMW Obscuration

**Table 4-5**  
**Protect EW Enablers, continued**

<b>PROTECT ELECTRONIC ATTACK ENABLERS, CONTINUED</b>			
<b>Ability to protect Facilities (that is, structures, buildings) from adverse effects of EW and EW enabled systems (fratricide or the adversary's ability to detect, ID, classify, locate, deny, degrade/disrupt, control, and/or destroy).</b>	-Limited electronic equipment hardening against EA. -Emission Control -Electronic masking	-MMW Obscuration -Improved Hardening for electronic components	-Advanced MMW Obscuration -Advanced hardening for electronic components

**4-7. Assessment of Move related EW Enabling Capabilities**

The *Move* functional concept describes the best means to improve the strategic responsiveness and operational agility of the future Modular Force. EW enabling capabilities enable both strategic responsiveness and operational agility. Table 4-6 depicts the current, mid term and far term move related EW enablers required by the future Modular Force.

**Table 4-6**  
**Move EW Enablers**

<b>MOVE ELECTRONIC WARFARE ENABLERS</b>			
<b>EW Enabling Capability Statement</b>	<b>Current</b>	<b>Near - Mid Term Migration</b>	<b>Far Term Migration</b>
<b>Ability to provide tactically responsive, long endurance EW capable platforms to locate and counter EW related anti-access threats.</b>	-Guard Rail: GRCS (Guard Rail Common Sensor) -Antiradiation missiles -Tactical SIGINT Payload -Support from joint and National assets (airborne and space based) -Prophet/Prophet Triton	-Modular Forces UAS (with EW capabilities) -RF Propagation modeling tools for both communications and radar -Aerial Common Sensor	-FCS UAS (with EW capabilities) -EA Assessment Tools -Multi-Mode Laser
<b>Ability to negate the enemy's ability to detect, identify, locate and track forces during movement and maneuver.</b>	-Convoy Planning Tool -Spectrum analyzers -EW Reprogramming -Limited hardening for electronic components	-Ground and airborne Jammers -Aerial Common Sensor -Spectrum Management tool -EW COP Application -EMCON Status Application/ Tool -RF De-confliction Application/ Tool -Millimeter wave obscuration -Modular Force UAS (with EW capabilities) -Networked Unmanned airborne and ground based EMS sensors -Networked Automated ASE-Sensors -Improved hardening for electronic components	-Advanced MMW Obscuration -FCS UAS (with EW capabilities) -Advanced hardening for electronic components

**4-8. Assessment of Sustain related EW Enabling Capabilities**

The *Sustain* functional concept establishes the overarching framework for logistics support to the future Modular Force. The concept seeks to answer the challenges to the future Modular Force that flow from the JOE. Table 4-7 depicts the current, mid term, and far term sustain-related EW enablers required to sustain the future Modular Force.



**Table 4-7  
Sustain EW Enablers**

<b>SUSTAIN ELECTRONIC WARFARE ENABLERS</b>			
<b>EW Enabling Capability Statement</b>	<b>Current</b>	<b>Near - Mid Term Migration</b>	<b>Far Term Migration</b>
<b>Ability to provide persistent threat warning to sustainment and maneuver support forces from operationally responsive joint and organic EW assets.</b>	<ul style="list-style-type: none"> <li>-Tactical SIGINT Payload</li> <li>-GRCS (Guard Rail Common Sensor)</li> <li>-RF detection systems (APR 39A)</li> <li>-Laser Detection Systems (AVR-2B)</li> <li>-Blue Force Tracker</li> <li>-Common Missile Warning System (CMWS)</li> <li>-Support from Joint and National assets (airborne and space based)</li> <li>-Prophet/Prophet Triton</li> </ul>	<ul style="list-style-type: none"> <li>-JCREWS</li> <li>-CESAS</li> <li>-Unattended Ground sensors</li> <li>- Modular Force UAS (with EW capabilities)</li> <li>- ACS</li> </ul>	<ul style="list-style-type: none"> <li>-EA Assessment Tools</li> <li>-FCS UAS (with EW capabilities)</li> </ul>
<b>Ability to detect, destroy or neutralize enemy emplaced mines at standoff distances.</b>	<ul style="list-style-type: none"> <li>-CREWS</li> <li>-Support from Joint assets</li> </ul>	<ul style="list-style-type: none"> <li>-JCREWS</li> <li>-CESAS</li> <li>- Modular Force UAS (with EA capabilities)</li> <li>-Airborne (manned) assets with EA capabilities</li> <li>Unmanned Vehicles (with EA capabilities)</li> </ul>	<ul style="list-style-type: none"> <li>-FCS UAS (with EA capabilities)</li> <li>-Airborne and ground based Laser weapon systems</li> </ul>
<b>Ability to negate the enemy's ability to detect, identify, locate and track sustainment and maneuver support forces.</b>	<ul style="list-style-type: none"> <li>-Convoy Planning Tool</li> <li>-Spectrum analyzers</li> <li>-Support from Joint and National assets (airborne and space based)</li> </ul>	<ul style="list-style-type: none"> <li>-MMW Obscuration</li> <li>-Mounted and Dismounted EA</li> <li>-Unattended/Unmanned EA/Jammers</li> <li>- Modular Force UAS (with EA capabilities)</li> <li>-RF Propagation modeling tools for both communications and RADAR</li> <li>-EW COP Application</li> </ul>	<ul style="list-style-type: none"> <li>-Advanced MMW Obscuration</li> <li>-FCS UAS (with EA capabilities)</li> </ul>

**Chapter 5  
Army EW Operational Architecture**

**5-1. Army EW Operational Architecture Products**

The primary purposes for developing the Army EW operations operational architecture products are to support the development of the Army EW CCP, and to describe how Army EW operations integrate with and perform as a part of the future Army. Included in this plan are three operational view (OV) products: the OV-1, which provided a high level graphical depiction and narrative of the EW capability concept in chapter 2 (see fig 2-4); and two OV-1 high level graphics in figures 5-1 and 5-2. The following OV-1 graphics are not intended to be full OV-1 operational architecture view products, but pictorial illustrations of two phases of a future operation that includes: shaping and entry and decisive operations.

# Shaping and Entry Operations



**Figure 5-1. Shaping and Entry Operations Graphic**

## 5-2. High-Level Concept Graphic – Shaping and Entry Operations

a. The EW capability as described in this CCP is a combination of EW skilled professionals capable of planning, integrating, coordinating, and synchronizing EW operations, and the EW systems used to support and execute EW operations. This EW capability includes the integration of national and joint level assets into tactical level operations.

b. During shaping and entry operations, the future Modular Force will rely heavily on the strategic and operational capabilities. This integrated network of national, military and commercial satellite based coverage provides important communications, ISR, imagery, weather, navigation, and timing data to support shaping and entry operations.

c. As depicted in figure 5-1, strategic space-based platforms and long loitering ISR assets provide the enabling support for the global projection of military force. This backbone is a component of the GIG and provides an uninterrupted reach capability to all deploying forces and geographically separated units. The strategic ISR layer provides the joint force commander with

advanced knowledge of the threat systems and forces operating within the EMS, and the location of those threat systems and forces. As joint ISR and EW assets flow into theater, these assets provide a second layer of capabilities to search for, intercept, and locate sources of radiated EME. All this information will be used to help build the electronic order of battle within the JOA, and will assist in threat recognition, targeting, and planning for the conduct of future EW operations.

d. These strategic and operational capabilities support IO, combat identification, joint blue force tracking, and SA; providing the support necessary for the uninterrupted flow of land power into the AO and setting the stage for decisive operations. The future Modular Force must be capable of leveraging these strategic and operational level capabilities to support EW planning and operations, both prior to and during entry operations.



Figure 5-2. Decisive Operations Graphic

### 5-3. High-Level Concept Graphic - Decisive Operations

a. During decisive operations the layered infrastructure of strategic space based ISR assets and operational level high and medium altitude airborne ISR and EW assets are further

augmented by tactical level airborne and ground based ES and EA capabilities of the future Modular Force, which will provide direct support to the future Modular Force.

b. Figure 5-2 portrays EW capabilities in support of the decisive operations phase. The three layers of supporting capabilities are not intended to depict a clean division between strategic, operational and tactical level capabilities; but are instead used to emphasize joint interdependency and the potential integration required to leverage nonorganic capabilities by the future Modular Force. The future Modular Force EW capabilities outlined in this CCP will serve as important links between the warfighter and the joint and national level capabilities depicted.

c. The first layer of capabilities includes space-based and high altitude long-loiter ISR assets, which provide the force with a persistent capability throughout the AO. It includes national and strategic capabilities which provide direct support to theater operations. The second layer consists of the joint airborne ISR and EW capabilities, which provide both a link to the national and strategic capabilities and can be leveraged to provide direct support to land component operations. The third layer depicts several future Modular Force airborne and ground based EW capabilities, which consist of the organic EW capabilities required to provide focused support to the land component's decisive operations and support AOR SA of the EME.

## Chapter 6 DOTMLPF Integrated Questions List

### 6-1. Introduction

a. There are important implications for the joint and Army community as the Army EW concept evolves. The integration and synchronization of EW operations across the DOTMLPF domains is required. There are joint interdependence issues associated with EW and therefore some study issues will go beyond the Army's direct role; however, the ability to influence the design and development of the range of DOTMLPF solutions for the joint force (particularly in the land domain) is an Army responsibility. Specific EW capabilities should be examined as part of a fully joint effort (such as AEA) as they will require an integrated effort by the Army and the joint community. Each of the Army's family of concepts used in the development of this CCP includes a discussion of the associated DOTMLPF implications for those concepts. Several of the concepts identify implications that directly relate to EW and are explicit enough to generate some action for change within the DOTMLPF domains by responsible proponents and agencies.

b. The *primary* implications arising from this CCP, vice an exhaustive list, are described below. The items cited below will require additional analysis before comprehensive actionable recommendations emerge.

(1) What are the most effective organizational designs for implementation of the Army EW plan?

(2) What are the objective and threshold capabilities required for achieving the EW plan?

(3) What future operational and organizational challenges remain from today's conceptual efforts?

(4) What EW capabilities does the Army have to provide other services in order for them to implement the EW plan?

(5) What EW training and training support capabilities does the Army have to provide to other services or integrate with other services to implement the "train as you fight" concept?

## 6-2. Doctrine

a. Emerging joint and Army doctrine will focus on the necessary capabilities to engage adversaries across the full range of joint operations sharing common systems, TTPs, and doctrine. The doctrinal concepts necessary to initiate the organizational and cultural changes are described in the joint capstone, operating, functional and integrating concepts, and the Army's capstone, operating and functional concepts. These concept documents must also be viewed in light of existing Army doctrinal publications such as: Field Manual (FM) 1 *The Army*, FM 3-0, *Operations*, FM 5-0, *Army Planning and Orders Production*, and FM 6-0, *Mission Command: Command and Control of Army Forces*.

b. As the future Modular Force nears operational readiness, these documents will continue to evolve. The evolution of organizations is driven by concepts and doctrine. Consequently, new doctrine and TTPs will be required to effectively plan and manage battles collaboratively. Evolving Army doctrine must seamlessly integrate joint doctrine to optimize planning and execution of warfighting operations at all levels. Doctrine questions include, but are not limited to, the following:

(1) Does current joint doctrine adequately address EW capabilities and integration with joint operations throughout a joint campaign?

(2) Does current Army doctrine adequately address Army EW capabilities and integration with the other Army operations and functions and with joint operations throughout a joint campaign?

(3) How does joint EW doctrine influence the conduct of Army EW operations?

(4) Does joint doctrine adequately address the joint interdependence of the services in the area of EW?

(5) What are the impacts of national and international law on joint and Army EW doctrine?

(6) What are the impacts of national rules of engagement, policies, and law on Army EW doctrine?

(7) Is EW adequately addressed in Army doctrine for the theater, corps, and division (and below) doctrinal publications?

(8) Are current TTPs adequate to execute required Army EW operations?

(9) Do proponent doctrinal publications integrate requisite Army EW operations?

(10) What emerging EW technologies, processes and capabilities need to be codified in Army doctrine?

(11) According to current joint and Army doctrine, EW is subdivided into the categories of EA, EP, and ES. Should this method of categorization be continued for the 2015-2024 timeframe? Are there better methods of categorizing EW?

(12) According to current joint and Army doctrine, EW is subdivided into the categories of EA, EP, and ES. EA is under the purview of operations (G3); EP is under the purview of the signal officer (G6); and ES is under the intelligence officer (G2). Are there better methods to organize EW staff responsibilities for the future Modular Force?

### **6-3. Organization**

a. To effectively support future operations, organizations must transform into more modular, scalable, mission-tailorable organizations with multifunctional capabilities. They must become more versatile and agile to support joint operations and must possess capabilities to adequately support the operations of maneuver and support forces. Joint mutual support becomes the key factor in determining Service roles and missions and mission context will determine the apportionment of Army headquarters and forces. The range of missions assigned to Army forces will force an alignment change from the traditional command echelons. Army HQ will support the combatant commander with the command structure appropriate for land operations.

b. The rank of the commander and the functions of the HQ will not necessarily correspond to the numbers of forces assigned to it. In many operations, the number and composition of subordinate units will differ dramatically. As each operation unfolds, the makeup of the deployed Army force will evolve, shifting in composition as the mission and circumstances require. While units that are stationed with the HQ may align for training and readiness, actual operational groupings will be based upon mission requirements. Organizational questions include, but are not limited to, the following:

(1) What are the appropriate organizational structures to enable effective Army EW operations?

(2) Are current Army organizations adequate to meet the EW operations requirements of the future Modular Force?

(3) Can current organizational structures be augmented to satisfy the capabilities of Army EW operations?

(4) Is a new organizational structure required to achieve the required capabilities?

(5) What Army EW operations capabilities should reside in our tactical and operational forces?

(6) Which types of organizations in the future Modular Force should have EA weaponry as organic assets?"

#### **6-4. Training**

a. Doctrine and organizational change cannot be realized without changes to our training systems. Training ensures that our future Modular Force is able to conduct the operations envisioned in our joint and Army concepts. By embedding EW capabilities and effects into future Modular Force training, commanders and leaders will begin to realize the impact of EW can have on operations. Training simulations that include EW operations and EW support planning and assessment, will improve our training opportunities in the functional areas of: battle command, see, strike, protect, move, and sustain.

b. Army training must be flexible enough to train and incorporate new technologies as they mature, and become available. The Army must develop Soldiers and leaders who possess a joint and expeditionary mindset and who are able to optimize the EW capabilities available to them. Training questions include, but are not limited to the following.

(1) How is the integration and application of EW included in current training and leader development?

(2) How can the Army adapt its training to better integrate Army EW operations?

(3) How will evolving technologies and ongoing or planned changes in organization affect the ways in which Army units and leaders operate and what are the training implications of these changes to support Army EW operations?

(4) How will evolving EW doctrine impact units and leaders?

(5) What training designs will develop units and leaders able to capitalize on the full range of EW capabilities?

(6) What are the EW operations training requirements for enlisted personnel, noncommissioned officers, officers, contractors and DA civilians?

(7) What type, scope, and frequency of Army EW operations training must the future Modular Force conduct to enable effective operations?

(8) What EW test and training ranges are necessary?

(9) What modeling and simulations are required to support Army EW operations at the tactical, operational and strategic levels?

(10) What joint EW training is necessary and for whom?

(11) What national and commercial agency training is necessary and for whom?

(12) What are the impacts of training requirements on the schools (that is, growth, resources, and others)?

## 6-5. Materiel

a. EW by its nature is rooted in technology and realized by materiel capabilities. Often these capabilities are expensive and may require significant investments in research and development, system design and development, test, training, maintenance, and logistics. Given the anticipated significant resources required to acquire and integrate EW capabilities into future force operations, it is incumbent upon all those involved with the acquisition process to look to future requirements and synergistically approach Army EW in a comprehensive integrated manner. The EMS is vast, yet at the same time is intricately linked and made interdependent by numerous technical parameters. Interoperability, compatibility in addition to operational effectiveness, must be considered and addressed prior to fielding these systems. As EW is primarily an enabling capability and impacts nearly all Army warfighting functions, the successful integration of EW and EW related systems is complicated and challenging. Additionally, since EW “lives” in a world that is to a great extent not tactile; for example, Soldiers cannot always see, hear, or feel effects in the EME, getting Soldiers and commanders to understand and appreciate what that “expensive gear” can actually do for them can be challenging.

b. Given that EW materiel can be expensive and the effects are difficult to measure and “display,” a number of questions arise, all related to emphasizing that the integration difficulties and costs of employing EW systems are worth the results realized in the land component commander’s AO. Some significant materiel questions include, but are not limited to the following:

(1) How will compatibility and interoperability as well as operational effectiveness be achieved for EW systems?

(2) What technologies are critical to consider and invest in, for the development of effective and capable EW materiel solutions?

(3) Given the “crowded” nature of the EMS, how can the Army effectively operate in the current and future EME?

(4) Given the technical nature of EW systems, how will the Army develop personnel and organizations capable of effectively executing EW planning, C2, operations, and maintenance?



(5) How will the Army effectively integrate EW capabilities given the highly interdependent and interrelated nature of EA, EP, and ES systems?

(6) Given the increasing technical interrelation of network operations, intelligence operations, C2 operations, and EW operations, and the implication that EW materiel applications may have a significant impact on all, how will the Army identify synergistic materiel approaches, as well as, effectively integrate these approaches into the Army's future Modular Force?

(7) Given the realities of physics, wave propagation, and size, weight and power, what technical and material capabilities should properly be pursued as Army capabilities and which should be left to joint dependence or interdependence?

#### **6-6. Leader Development and Education.**

a. One of the keys in enabling effective EW will be the development of leaders and staffs that can perform effectively across the spectrum of operations in a complex, uncertain, and dynamic OE. Leaders must be educated, trained, and developed to be self-aware, innovative, and adaptive throughout training and operations. They must think strategically as well as tactically, possess a joint and expeditionary mindset, and successfully apply the joint operational art across the range of EW operations. Leaders will also need joint/interagency and multinational education and experience early in their careers. Doctrine will provide intellectual foundation, educational opportunities will prepare leaders for how to think, robust and realistic training coupled with operational and experience will convert knowledge into operational competence.

b. Our system of leader development must focus on the human qualities of initiative, mature judgment, mature judgment, flexibility, trust, and teamwork to realize the full benefit of EW. The Army must instill audacity in our leaders and condition them away from passivity in the absence of certainty. As previously noted, a leader's staff must also be educated, trained, and developed. Consequently, changes that impact the mix and capabilities of staff specialists and generalists are significant. The rapid evolution of automated systems and capabilities require a change in leader development to ensure future leaders can leverage these new tools. Emerging technology will help leaders focus on critical decisions, highlight opportunities for initiative, and facilitate teamwork.

c. Future Modular Force leaders must be trained to aggressively manage information and instill trust in the output of decision support tools that automated systems provide. Other major implications include: adoption of a lifetime of education paradigm and the creation of knowledge centers configured to support professional leader education. Leader development questions include, but are not limited to, the following.

(1) How do we develop leaders ready to deal with the complexity of the contemporary operating environment, threats, and interagency implications?

(2) How can we develop more adaptive leaders, versatile in EW operations?

(3) How do we provide collaborative, distributed training problem solving and decision aids that empower battle command to support commanders, as well as staffs to advising commanders during planning, preparation, rehearsal, and execution of EW exercises and operations?

(4) How are leaders enabled to know the terrain and weather and appreciate their tactical implications for tactical concealment, employment of weapons, mobility, and seeking positions of advantage as these relate to EW?

(5) How can we incorporate EW into training exercises and leader development to positively reinforce leader awareness of and facility in EW planning and operations?

(6) How are leaders empowered to understand the OE as well as, or better than, the threat in order to execute EW detect, assess, and decide functions?

(7) How will units adapt to emerging EW situations more quickly than an adversary?

## **6-7. Personnel**

a. Soldiers are the Army's greatest resource and the most important factor in maintaining and effecting unit readiness. The integration of EW operations into future Modular Force operations will increase the demands on an already stressed population. Selecting the right personnel and assigning occupational specialties to EW related positions is a difficult task. The personnel management system must ensure that it provides the career paths needed to fully utilize the EW expertise of the force.

b. The right combinations of Active Army, Army Reserve, Army civilian and contractor attendants can only be determined through research and exercise. Personnel questions relating to EW operations include, but are not limited to the following.

(1) How do we recruit and retain the personnel necessary to perform Army EW operations functions?

(2) What skill sets are required in our Army civilian and contractor support personnel?

(3) What is the best means of selecting Army EW officers?

(4) Should our pre-commissioning programs include an EW operations component?

(5) What is the right mix of personnel between EW professionals and other personnel selected to serve in EW related positions?

(6) What will be the EW personnel impacts as they relate to other proponents?

(7) What will be the personnel end strength impacts as related to required EW capabilities?

## 6-8. Facilities

a. The facilities necessary to support EW operations are anticipated to be significant. The highly technical aspects of EW lead to highly technical and typically expensive facility and infrastructure support requirements. The ability to effectively and efficiently conduct test and training operations using EW systems will require a robust infrastructure. Such facilities and infrastructure must allow networked and distributed operations as well as multi-layered security constructs. Not only are there significant security issues typically associated with EW, but there are EMS issues both within and outside of the continental U.S. that must be considered. Consequently, developing capabilities that facilitate EW development, testing, and training will be almost as important as developing the EW systems themselves. Every effort must be made to leverage current facilities and infrastructure regardless of whether they are Army, other Services, or joint.

b. Secure access to critical EW data, relative to friendly and enemy systems, must be a priority for Army information networks. Developing procedures that deliver critical EW data must be established and updated continuously in order to keep systems and personnel current and fully capable. The infrastructure hardware, software, and procedures should be capable of supporting test, training, and real world operations across the globe. Improving strategic response will require upgrades of Army facilities and infrastructure. The Army will require significant investments IOT develop, test, train, sustain, mobilize, and deploy EW capabilities in accordance with future force concepts.

c. The future force must support the concept, “train as you fight” and strive to create a realistic training environment. The planning and resourcing for facility and infrastructure must be initiated with sufficient lead time to reach maturity synchronous with the future Modular Force and anticipated technology developments associated with EW. Facilities questions include, but are not limited to the following.

(1) Are there adequate facilities available to effectively develop, test, and train EW capabilities so that personnel understand and have confidence in the EW system?

(2) What infrastructure is required at Army and DOD installations to adequately support Army EW programs consistent with joint, Army, and multinational concepts and as specified joint national training center attributes?

(3) What infrastructure is required in theater to support EW missions?

## Chapter 7

### Hypothesis Testing – Experimentation and Wargames

#### 7-1. Introduction

a. The Army is pursuing the most comprehensive transformation of its forces since the early years of World War II. This transformation is happening while the nation is at war. The urgency

of supporting the current fight blurs the usual dichotomy between the current and future Modular Force. The Army must seek to accelerate inculcation of select future Modular Force capabilities into the current Modular Force to support today's fight, while simultaneously ensuring that today's lessons learned are applied to future Modular Force developments.

b. This transformation encompasses more than materiel solutions, and requires adaptive and determined leadership, innovative concept development and experimentation, and the integration of lessons learned from recent operations to produce corresponding changes in the DOTMLPF domains. Experimentation, wargames and experience are the methods the Army uses to mitigate risk while considering and improving capabilities for the future Modular Force.

## **7-2. Experimentation**

a. Experimentation is the process of exploring innovative methods of operation to access feasibility, evaluate utility and or determine limitations of the concepts being explored. Experiments conducted in support of Joint Capabilities Integration Development System efforts use the 2015–2024 timeframe. The Army also conducts wargames using futuristic scenarios (15 to 20 years and beyond) to explore concepts in order to better define which of those concepts should be the subject of experimentation. Army experimentation is usually conducted in the form of discovery (usually in a constructive modeling and simulation environment), hypothesis (also in a modeling and simulation environment but with human in the loop role players) and demonstration (live or simulation) settings.

b. Discovery experiments are designed to inform a concept. The setting tends to lack the degree of control necessary to infer cause and effect.

c. Hypothesis Testing Experiments. Hypothesis testing experiments are the traditional type used by individuals to build, confirm and advance knowledge. This occurs by seeking to falsify specific hypotheses (specifically if...then statements) or discovering its limitations. In order to conduct hypothesis-testing experiments, the experimenter creates a situation in which one or more factors of interest can be observed systematically under conditions that vary the values of factors thought to cause change in the factors of interest, while other potentially relevant factors are held constant.

d. Demonstration experiments are used to display knowledge and the settings tend to be somewhat orchestrated. Often times the Army uses this method to display prototypes of emerging technologies that are nearing maturity and are potentially ready for fielding to the force.

## **7-3. Modeling and Simulations**

Models and simulations are often called upon to make an informed assessment. Scenarios or vignettes are built to look at one or more sets of conditions that will best help to evaluate these hypotheses, but the raw data is often not conclusive or requires reasoned review by seasoned subject matter experts to confirm the reliability of these simulation or modeling efforts. Future EW modeling requires comprehensive operational and technical analyses in near real time in support of the military decision making process for EW C2 across FSO. The operational

analysis should address current and projected friendly/enemy future EW C2, with emphasis on the coordination, synchronization, and deconfliction of EW operations. The technical analysis should address friendly/enemy signal and environmental parameters for current and projected future EW capabilities. Future EW modeling and C2 tools should be developed as part of an interactive system capability that includes EW support to IO and the warfighting functions.

#### **7-4. Concept Development and Experimentation**

a. Concept development and experimentation is fundamentally a risk reduction activity; failure to conduct effective concept development and experimentation significantly increases developmental risk for the future Modular Force and operational risk to the current Modular Force. Specific actions are required to reduce operational risk to the current modular force and development risk for the future Modular Force.

(1) *Operational risk to the current force.* Increase the capabilities of the current Modular Force through prototype experiments that test the compelling solutions and develop DOTMLPF capability packages to support the spiraling forward of future Modular Force capabilities to satisfy critical current force operational needs.

(2) *Developmental risk for the future Modular Force.* Reduce future Modular Force development risk by developing concepts and capabilities that meet the needs of the future joint force commander through rigorous concept development experimentation.

b. Army efforts. Army wargaming and experimentation to support this CCP for Army EW operations and its impact on DOTMLPF sets will be developed and studied using approved defense planning scenarios and vignettes, if required, other scenarios and vignettes may be recommended or other methods found to evaluate aspects of EW operations. Experimentation will help define how the capability requirements, outlined in chapter 3 of the CCP, can best be implemented.

c. Joint efforts. Joint wargaming and experimentation will also support this CCP. Active participation in other Service and well as joint events are critical to the full assessment of the Army's DOTMLPF solution sets. Army EW operations will be tested, evaluated and modified as conditions (for example, scenario, vignette) change during experimentation. Scenarios and vignettes selected for experimentation will provide an illustration of how organizations will conduct or support EW operations throughout the deployment cycle while supporting the full spectrum of conflict.

#### **7-5. Wargaming**

Wargaming is a process of discovery and assessment. It begins by attaining operational research on future warfighting systems and concepts and applying the results of this research to simulated military operations. Its objective is to prove or disprove visionary ideas and to discover gaps and seams in future Army EW operations. Wargaming examines Army functional concepts of *Battle Command, See, Move, Strike, Protect, and Sustain*, the results of which inform experimentation and eventually informs the development of Army EW CONOPS, TTPs, architectures, and future systems. Wargame personnel lead participation in Army, JIM wargames to integrate Army EW

assets, concepts, and visions into wargame scenarios, orders of battle, force lay downs, and computer simulations.

## 7-6. Past and Future Experimentation and Wargames

a. Past Experimentation and Wargames. TRADOC and its proponent schools have participated in several major experiments and wargames that have involved EW as a core capability of IO. The following is a list of major experiments and wargames conducted over the last two years that have involved IO support.

- Joint Forces Experiment 2004 and Joint Forces Experiment 2006.
- Unified Quest 2004, 2005, 2006.
- Urban Resolve 2015 in fiscal year 2007.

b. Future Experimentation. The following experiments and wargames will further assist in defining the *Army EW Operations CCP*.

- Unified Quest 2008, 2009.
- Urban Resolve Series.
- Joint Forces Experiments.
- FCS focused experiments and events.
- Air Force AEA experimentation and wargaming.

c. In addition to these listed events there are many smaller analysis events and experiments that occur within the Army battle labs and throughout various installations that will also provide insights to further refine this CCP.

## 7-7. Study Questions

In addition to the integrated questions list in chapter 6, the following questions will help to support future experimentation:

- a. What are the Army EW capability gaps?
- b. In a distributed operation environment, what EW operations forces and capabilities are required at each echelon of command?
- c. What EW operations, missions, and functions is the responsibility of the signal, military intelligence, armor, infantry, engineer, field artillery and air defense proponents?
- d. How do Army space forces support EW operations?
- e. What advanced operational and training tool sets are required to support adequate Soldier training and development for EW operations?
- f. What are future Modular Force vulnerabilities to technology failures in the area of EW-based enablers?

- g. What are the current critical EW enabling capability gaps for near-term, mid-term, and far-term?
  - h. What EW-based or enabling technologies are so compelling as to warrant immediate prototyping?
  - i. What prototypes are under development?
- 

## **Chapter 8**

### **Alternative CCP**

#### **8-1. Introduction**

a. Currently, there are no U.S. Army documents that provide a plan for integrating EW into operations. The EW CCP is the first Army specific document that attempts to provide a plan for an integrated EW capability by conceptualizing a future EW family of systems that will provide an integrated EW capability across proponents, and develop separate capabilities that can be fully integrated into an overarching EW capability. EW capabilities do not fit neatly into any one specific warfighting function, but will positively affect and support all warfighting functions when integrated into FSO. Through the integration of the EW capabilities outlined in this CCP, a commander, will have the ability to dominate the EMS within his AO.

b. There were many concepts referenced in the development of this document. The required and related references are included in appendix A. Currently, no Service level operational concepts for EW exist, and therefore the JROC approved STRATCOM OCEW was used to provide the higher level conceptual framework for the development of the EW CCP. To ensure proper integration with the Army concept strategy framework, each proponent involved in the EW CCP development, provided input into the family of Army concepts. The purpose of this effort was to ensure specific proponent missions and mission areas related to EW were fully addressed and would provide the appropriate linkages required to the Army concept strategy in future concept development. The EW CCP is part of this effort, and follow-on analysis will serve to support the necessary development of specific capabilities to bring the concept to fruition.

c. Base on initial assessments, Army EW across all the domains of DOTMLPF is in need of attention. Trained and educated personnel, properly organized and manned staffs, superior equipment, thorough testing, actionable intelligence, realistic exercises, flexible CONOPS, synchronized effects, and a rigorous and continuous analytic process, are all required to enable an effective EW capability within the Army. In order to realize the EW vision articulated in this plan, the Army must bridge existing DOTMLPF capability gaps. The Army must train and educate personnel to be capable of planning, coordinating and synchronizing EW into FSO. Senior leaders must possess a thorough understanding of the capabilities of EW in order to gain and maintain full spectrum dominance within their AO. All Army leaders, planners, operators, maintainers and acquisition personnel involved with EW must understand the EMS, as well as the advances and proliferation of threat systems, in order to positively impact the full scope of

required EW capabilities. The EW CCP will require refinement over time based on lessons learned, experimentation and wargaming. It is the cornerstone on which the Army will begin to build the capabilities required to enable full spectrum dominance within the land force commander's AO.

**8-2. Future Joint Capabilities Integration Development System Efforts**

At a minimum it is expected that approval of this CCP will result in TRADOC ARCIC directing a CBA. The underlying intent of this CCP is to provide a holistic view of the Army's dependence on the EMS and the EW capabilities that will ensure the future Modular Force's ability to dominate that spectrum within their AO.



## **Appendix A References**

### **Required References**

Capstone Concept for Joint Operations, Version 2.0.

Field Manual 3-0  
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Joint Publication 3-13.1  
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The Army.

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Homeland Security, Joint Operating Concept, Version 1.0.

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National Military Strategy of the United States of America.

National Defense Strategy of the United States of America.

Net-Centric Operational Environment, Joint Integrating Concept, Version 1.0.

OSD-Transformation Planning Guidance.

Protection, Joint Functional Concept.

TRADOC Pam 525-3-1

Army Operating Concept for Operational Maneuver 2015-2024.

TRADOC Pam 525-3-2

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TRADOC Pam 525-2-1

The United States Army Functional Concept for See 2015-2024.

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The United States Army Functional Concept for Strike 2015-2024.

TRADOC Pam 525-3-6

The United States Army Functional Concept for Move 2015-2024.

TRADOC Pam 525-4-1

The United States Army Functional Concept for Sustain 2015-2024.

TRADOC Pam 525-3-3

The United States Army Functional Concept for Battle Command 2015-2024.

TRADOC Pam 525-3-5

The United States Army Functional Concept for Protect 2015-2024.

TRADOC Pam 525-7-4

The United States Army Concept Capability Plan for Space Operations 2015-2024.

TRADOC Pam 525-7-1

The United States Army Concept Capability Plan for Unit Protection 2015-2024.

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Force Operating Capabilities.

Under Secretary of Defense for AT&L, Electronic Warfare Capability Area Review Acquisition Decision Memorandum.

U.S. Army Campaign Plan, with Change 5.

U.S. Army Strategic Planning Guidance.

U.S. Army Transformation Roadmap.

U.S. Strategic Command Fact Sheet, Joint Information Operations Warfare Command.

## Glossary

### Section I

#### Abbreviations

A-3	Air Force Operations Directorate (COMAFFOR)
ABCS	Army battle command system
AEA	airborne electronic attack
AH64D	Apache Longbow
AMD	air and missile defense
AN/ALQ-136	airborne, automatic, electronic radar jammer
AN/ALQ-144	infrared countermeasure system
AN/APR-39	digital threat warning system
ANW	airborne networking waveform
AO	area of operations
AOC	air operations center
AOR	area of responsibility
ASE	aircraft survivability equipment
APOD	aerial port of debarkation
AVR-2B	laser set warning system
BCT	brigade combat team
BFT	blue force tracker
C2	command and control
C2W	command and control warfare
C3D2	camouflage, cover, concealment, denial, and deception
CBA	capabilities-based assessment
CCJO	Capstone Concept for Joint Operations
CCP	concept capability plan
CEOI	communication-electronics operating instructions
CESAS	communication emitter sensing and attacking system
CJFACC	combined joint force air component commander
CJFLCC	combined joint force land component commander
CJFMCC	combined joint force maritime component commander
CJTF	combined joint task force
CMWS	common missile warning system
CNO	computer network operations
COMSEC	communications security
CONOPS	concept of operations
COP	common operational picture
CREW	counter remote control improvised explosive device electronic warfare
CSB ME	combat support brigade maneuver enhancement
DB	database
DE	directed energy
DOD	Department of Defense
DOTMLPF	doctrine, organization, training, materiel, leader development, personnel, and facilities.

EA	electronic attack
ELINT	electronic intelligence
EM	electromagnetic
EMC	electromagnetic compatibility
EMCON	emission control
EME	electromagnetic environment
EMS	electromagnetic spectrum
EP	electronic protection
ES	electronic warfare support
EW	electronic warfare
EWCC	electronic warfare coordination cell
FBCB2	force twenty-one battle command, brigade and below
FCS	future combat system
FCS-BC	future combat system battle command
FSO	full spectrum operations
FP	force protection
GCCS-A	global command and control system – Army
GEMSIS	global electromagnetic spectrum information system
GIG	global information grid
HERO	hazards of electromagnetic radiation to ordnance
HBCT	heavy brigade combat team
HPM	high powered microwave
ICMD	improved countermeasure dispensing system
IED	improvised explosive device
IO	information operations
IR	infrared
ISR	intelligence, surveillance, and reconnaissance
JCA	jamming control authority
JFACC	joint force air component commander
JFC	joint functional concept
JFLCC	joint force land component commander
JIC	joint integrating concept
JIEDDO	Joint IED Defeat Organization
JIM	joint, interagency, multinational
JOA	joint operations area
JOC	joint operating concept
JOE	joint operating environment
JP	joint publication
JRFL	joint restricted frequency list
JSPTF	joint special operations task force
JTF	joint task force
JTF-GNO	joint task force global network operations
JTRS	Joint Tactical Radio System
LOC	lines of communication
MCO	major combat operations
MDMP	military decision making process

MEB	Marine expeditionary brigade
MILDEC	military deception
MMW	millimeter wave
NATO	North Atlantic Treaty Organization
NECC	network-enabled command capability
NETWARCOM	network warfare command
OCEW	operational concept for electronic warfare
OE	operational environment
OPLAN	operation plan
OPORD	operation order
OPSEC	operations security
OV	operational view
PA	public affairs
PSYOP	psychological operations
RADBN	radio battalion
RCIED	radio controlled improvised explosive device
RF	radio frequency
RFI	radio frequency interference
RF CM	radio frequency countermeasures
ROMO	range of military operations
RWR	radar warning receiver
SA	situational awareness
SATCOM	satellite communication
SIGINT	signal intelligence
SIIRCM	suite of integrated infrared countermeasures
SOF	special operations forces
SPOD	seaport of debarkation
SU	situational understanding
TADIL	tactical digital information link
TEL	transporter-erector-launcher
TSS	target sensing system
TTP	tactics, techniques, and procedures
UAS	unmanned aerial system
U.S.	United States
USSTRATCOM	United States Strategic Command
WARM	wartime reserve modes
WIN-T	warfighter information tactical
WMD	weapons of mass destruction

## Section II

### Terms

#### **actionable intelligence**

Providing commanders and Soldiers a high level of situational understanding, delivered with speed, accuracy and timeliness, in order to conduct successful operations. (U.S. Army Task Force – Actionable Intelligence).

**active air defense**

Direct defensive actions taken to destroy, nullify, or reduce the effectiveness of hostile air and missile threats against friendly forces and assets. It includes the use of aircraft, air defense weapons, electronic warfare, and other available weapons. (FM 1-02) See FM 44-100.

**Army service component command**

The senior Army echelon in a theater and the Army component of a unified command. It includes the service component commander and all Army personnel, organizations, units, and installations that have been assigned to the unified command. (FM 1-02) See FM 100-7.

**battlespace**

The environment, factors, and conditions that must be understood to successfully apply combat power, protect the force, or complete the mission. This includes the air, land, sea, space, and the included enemy and friendly forces; facilities; weather; terrain; the electromagnetic spectrum; and the information environment within the operational areas and areas of interest. (JP 1-02).

**chaff**

Radar confusion reflectors consisting of thin, narrow metallic strips of various lengths and frequency responses, which are used to reflect echoes for confusion purposes. Causes enemy radar guided missiles to lock on to it instead of the real aircraft, ship, or other platform. See also deception. (JP 1-02).

**combatant command (command authority)**

Nontransferable command authority established by Title 10 ("Armed Forces"), U.S. Code, Section 164, exercised only by commanders of unified or specified combatant commands unless otherwise directed by the President or Secretary of Defense. Combatant command (command authority) cannot be delegated and is the authority of a combatant commander to perform those functions of command over assigned forces involving organizing and employing commands and forces, assigning tasks, designating objectives, and giving authoritative direction over all aspects of military operations, joint training, and logistics necessary to accomplish the missions assigned to the command. Combatant command (command authority) should be exercised through the commanders of subordinate organizations. Normally this authority is exercised through subordinate joint force commanders and Service and/or functional component commanders. Combatant command (command authority) provides full authority to organize and employ commands and forces as the combatant commander considers necessary to accomplish assigned missions. Operational control is inherent in combatant command (command authority). (JP 1-02).

**communications security**

The protection resulting from all measures designed to deny unauthorized persons information of value which might be derived from the possession and study of telecommunications, or to mislead unauthorized persons in their interpretation of the results of such possession and study. Communications security includes: a. crypto-security; b. transmission security; c. emission security; and d. physical security of communications security materials and information. (JP 1-02).

**computer network operations**

Comprised of computer network attack, computer network defense, and related computer network exploitation enabling operations. (Approved for inclusion in the next edition of JP 1-02.).

**control**

Authority that may be less than full command exercised by a commander over part of the activities of subordinate or other organizations. (2) In mapping, charting, and photogrammetry, a collective term for a system of marks or objects on the Earth or on a map or a photograph, whose positions or elevations (or both) have been or will be determined. (3) Physical or psychological pressures exerted with the intent to assure that an agent or group will respond as directed. (4) An indicator governing the distribution and use of documents, information, or material. Such indicators are the subject of intelligence community agreement and are specifically defined in appropriate regulations. (JP 1-02).

**counterreconnaissance**

All measures taken to prevent hostile observation of a force, area, or place. (DOD).

**deception**

Those measures designed to mislead the enemy by manipulation, distortion, or falsification of evidence to induce the enemy to react in a manner prejudicial to the enemy's interests. (JP 1-02). See also; electronic deception.

**degrade**

In information operations, using nonlethal or temporary means to reduce the effectiveness or efficiency of adversary C2 systems and information collection efforts or means. (FM 3-13).

**denial measure**

An action to hinder or deny the enemy the use of space, personnel, or facilities. It may include destruction, removal, contamination, or erection of obstructions. (DOD-NATO).

**deny**

(Army) In information operations, entails withholding information about Army force capabilities and intentions that adversaries need for effective and timely decisionmaking. (FM 3-13). See also denial measure.

**destroy**

(1). A tactical mission task that physically renders an enemy force combat-ineffective until it is reconstituted. (2) To damage a combat system so badly that it cannot perform any function or be restored to a usable condition without being entirely rebuilt. (FM 1-02).

**directed energy**

An umbrella term covering technologies that relate to the production of a beam of concentrated electromagnetic energy or atomic or subatomic particles. (JP 1-02).



**directed-energy warfare**

Military action involving the use of directed-energy weapons, devices, and countermeasures to either cause direct damage or destruction of enemy equipment, facilities, and personnel, or to determine, exploit, reduce, or prevent hostile use of the electromagnetic spectrum through damage, destruction, and disruption. It also includes actions taken to protect friendly equipment, facilities, and personnel and retain friendly use of the electromagnetic spectrum. (JP 1-02).

**directed-energy weapon**

A system using directed energy primarily as a direct means to damage or destroy enemy equipment, facilities, and personnel. (JP 1-02).

**direction finding**

A procedure for obtaining bearings of radio frequency emitters by using a highly directional antenna and a display unit on an intercept receiver or ancillary equipment. (JP 1-02).

**disrupt**

(1) A tactical mission task in which a commander integrates direct and indirect fires, terrain, and obstacles to upset an enemy's formation or tempo, interrupt his timetable, or cause his forces to commit prematurely or attack in piecemeal fashion. (FM 3-90). (2) An engineer obstacle effect that focuses fire planning and obstacle effort to cause the enemy to break up his formation and tempo, interrupt his timetable, commit breaching assets prematurely, and attack in a piecemeal effort. (FM 90-7). (3) In information operations, breaking and interrupting the flow of information between selected command and control nodes. (FM 3-13).

**electromagnetic deception**

The deliberate radiation, re-radiation, alteration, suppression, absorption, denial, enhancement, or reflection of electromagnetic energy in a manner intended to convey misleading information to an enemy or to enemy electromagnetic-dependent weapons, thereby degrading or neutralizing the enemy's combat capability. Among the types of electromagnetic deception are: a. manipulative electromagnetic deception. Actions to eliminate revealing, or convey misleading, electromagnetic telltale indicators that may be used by hostile forces; b. simulative electromagnetic deception. Actions to simulate friendly, notional, or actual capabilities to mislead hostile forces; and c. imitative electromagnetic deception. The introduction of electromagnetic energy into enemy systems that imitates enemy emissions. (JP 1-02).

**electromagnetic environment**

The resulting product of the power and time distribution, in various frequency ranges, of the radiated or conducted electromagnetic emission levels that may be encountered by a military force, system, or platform when performing its assigned mission in its intended operational environment. It is the sum of electromagnetic interference; electromagnetic pulse; hazards of electromagnetic radiation to personnel, ordnance, and volatile materials; and natural phenomena effects of lightning and precipitation static. (JP 1-02).

**electromagnetic hardening**

Action taken to protect personnel, facilities, and/or equipment by filtering, attenuating, grounding, bonding, and/or shielding against undesirable effects of electromagnetic energy. (JP 1-02).

**electromagnetic interference**

Any electromagnetic disturbance that interrupts, obstructs, or otherwise degrades or limits the effective performance of electronics and electrical equipment. It can be induced intentionally, as in some forms of electronic warfare, or unintentionally, as a result of spurious emissions and responses, inter-modulation products, and the like. (JP 1-02).

**electromagnetic jamming**

The deliberate radiation, re-radiation, or reflection of electromagnetic energy for the purpose of preventing or reducing an enemy's effective use of the electromagnetic spectrum, and with the intent of degrading or neutralizing the enemy's combat capability. (JP 1-02).

**electromagnetic spectrum**

The range of frequencies of electromagnetic radiation from zero to infinity. It is divided into 26 alphabetically designated bands. (JP 1-02).

**electronic attack**

Division of EW involving the use of electromagnetic energy, directed energy, or antiradiation weapons to attack personnel, facilities, or equipment with the intent of degrading, neutralizing, or destroying enemy combat capability and is considered a form of fires. (JP 3-13.1).

**electronic intelligence**

Technical and geo-location intelligence derived from foreign noncommunications electromagnetic radiations emanating from other than nuclear detonations or radioactive sources. (JP 1-02).

**electronic masking**

The controlled radiation of electromagnetic energy on friendly frequencies in a manner to protect the emissions of friendly communications and electronic systems against enemy electronic warfare support measures/signals intelligence without significantly degrading the operation of friendly systems. (JP 1-02).

**electro-optical-infrared countermeasure**

(DOD) Any device or technique employing electro-optical-infrared materials or technology that is intended to impair the effectiveness of enemy activity, particularly with respect to precision guided weapons and sensor systems. Electro-optical-infrared is the part of the electromagnetic spectrum between the high end of the far infrared and the low end of ultraviolet. Electro-optical-infrared countermeasure may use laser and broadband jammers, smokes/aerosols, signature suppressants, decoys, pyrotechnics/pyrophorics, high-energy lasers, or directed infrared energy countermeasures. (JP 1-02).

**electronic probing**

Intentional radiation designed to be introduced into the devices or systems of potential enemies for the purpose of learning the functions and operational capabilities of the devices or systems. (JP 1-02).

**electronic protection**

(See electronic warfare.) Division of electronic warfare involving passive and active means taken to protect personnel, facilities, and equipment from any effects of friendly or enemy employment of EW that degrade, neutralize, or destroy friendly combat capability. (JP 3-13.1).

**electronic warfare**

Any military action involving the use of electromagnetic and directed energy to control the electromagnetic spectrum or to attack the enemy. The three major subdivisions within electronic warfare are: electronic attack, electronic protection, and electronic warfare support. (JP 3-13.1).

**electronic warfare reprogramming**

The deliberate alteration or modification of EW or TSS, or the TTP that employ them, in response to validated changes in equipment, tactics, or the electromagnetic environment. These changes may be the result of deliberate actions on the part of friendly, adversary or third parties; or may be brought about by electromagnetic interference or other inadvertent phenomena. The purpose of EW electronic warfare reprogramming is to maintain or enhance the effectiveness of electronic warfare EW and target sensing system TSS equipment. EW reprogramming includes changes to self-defense systems, offensive weapons systems, and intelligence collection systems. (JP 3-13.1).

**electronic warfare support**

(See electronic warfare.) Division of electronic warfare involving actions tasked by, or under direct control of, an operational commander to search for, intercept, identify, and locate or localize sources of intentional and unintentional radiated electromagnetic energy for the purpose of immediate threat recognition, targeting, planning and conduct of future operations. Electronic warfare support provides information required for decisions involving electronic warfare operations and other tactical actions such as threat avoidance, targeting, and homing. (JP 3-13.1).

**electronics security**

The protection resulting from all measures designed to deny unauthorized persons information of value that might be derived from their interception and study of noncommunications electromagnetic radiations, that is radar. (JP 1-02).

**emission control**

The selective and controlled use of electromagnetic, acoustic, or other emitters to optimize C2 capabilities while minimizing, for operations security, detection by enemy sensors, minimize mutual interference among friendly systems, and execute a military deception plan. (JP 1-02).

**equipment**

In logistics, all nonexpendable items needed to outfit or equip an individual or organization. See also assembly; component; subassembly; supplies. (DOD)

**exploit**

In information operations, to gain access to adversary C2 systems to collect information or to plant false or misleading information. (FM 3-13).

**force protection**

Actions taken to prevent or mitigate hostile actions against DOD personnel (to include family members), resources, facilities, and critical information. Force protection does not include actions to defeat the enemy or protect against accidents, weather, or disease. (JP 3-0).

**frequency deconfliction**

A systematic management procedure to coordinate the use of the electromagnetic spectrum for operations, communications, and intelligence functions. Frequency deconfliction is one aspect of spectrum management. (JP 1-02).

**global information grid**

The globally interconnected, end-to-end set of information capabilities, associated processes and personnel for collecting, processing, storing, disseminating and managing information on demand to warfighters, policy makers, and support personnel. Includes all owned and leased communications and computing systems and services, software (including applications), data, security services and other associated services necessary to achieve information superiority. It also includes National Security Systems and supports all DOD, National Security, and related intelligence community missions and functions (strategic, operational, tactical and business), in war and in peace. Provides capabilities from all operating locations (bases, posts, camps, stations, facilities, mobile platforms and deployed sites). Provides interfaces to coalition, allied, and non-DOD users and systems. (JP 3-05.1).

**high-payoff target**

A target whose loss to the enemy will significantly contribute to the success of the friendly course of action. High-payoff targets are those high-value targets that must be acquired and successfully attacked for the success of the friendly commander's mission. See also high-value target. (JP 3-60).

**high-value target**

A target the enemy commander requires for the successful completion of the mission. The loss of high-value targets would be expected to seriously degrade important enemy functions throughout the friendly commander's area of interest. (JP 3-09).

**imitative communications deception**

That division of deception involving the introduction of false or misleading but plausible communications into target systems that mimics or imitates the targeted communications. (JP 1-02).

**improvised explosive device**

A device placed or fabricated in an improvised manner incorporating destructive, lethal, noxious, pyrotechnic, or incendiary chemicals and designed to destroy, incapacitate, harass, or distract. It may incorporate military stores, but is normally devised from nonmilitary components. (JP 1-02).

**information operations**

The integrated employment of the core capabilities of electronic warfare, computer network operations, psychological operations, military deception, and operations security, in concert with specified supporting and related capabilities, to influence, disrupt, corrupt or usurp adversarial human and automated decision making while protecting our own. (JP 3-13).

**intelligence, surveillance, and reconnaissance**

An activity that synchronizes and integrates the planning and operation of sensors, assets, and processing, exploitation, and dissemination systems in direct support of current and future operations. This is an integrated intelligence and operations function. (JP 2-01).

**Joint Improvised Explosive Device Defeat Organization (JIEDDO)**

The Joint IED Defeat Organization (JIEDDO) has its roots in a tiny Army initiative. The Army IED Task Force was established in October 2003 by the Army Chief of Staff to orchestrate Army efforts to eliminate IED threats, recommend best available responses and direct development and fielding of selected solutions. As the result of a request by the CENTCOM commander for a synchronized DoD response to the IED threat, this Army organization was transformed by then Deputy Secretary of Defense Paul Wolfowitz into the Joint IED Defeat Task Force in July 2004. The Joint IED Defeat Task Force was further redefined under DoD Directive 2000.19 in July 2005 by Deputy Secretary of Defense Gordon England. Under this directive, the Director of the Joint IED Defeat Task Force reported directly to the Deputy Secretary of Defense and the process for fielding life-saving technologies was further streamlined. In December 2006, the JIEDDO was established as a permanently manned entity. JIEDDO pulls together all available resources within the Department of Defense, across the private sector, and from our allies and coalition partners to combat the IED threat.

**joint restricted frequency list**

A time and geographically-oriented listing of TABOO, PROTECTED, and GUARDED functions, nets, and frequencies. It should be limited to the minimum number of frequencies necessary for friendly forces to accomplish objectives. (JP 1-02).

**millimeter wave obscuration**

Millimeter wave obscuration denies reconnaissance, surveillance, and target acquisition devices operating in the 9-96 gigahertz range.

**operations security**

A process of identifying critical information and, subsequently, analyzing friendly actions attendant to military operations and other activities to: a. Identify those actions that can be observed by adversary intelligence systems. b. Determine indicators hostile intelligence systems might obtain that could be interpreted or pieced together to derive critical information in time to

be useful to adversaries. c. Select and execute measures that eliminate or reduce to an acceptable level the vulnerabilities of friendly actions to adversary exploitation. (JP 1-02).

**physical security**

(DOD, NATO). That part of security concerned with physical measures designed to safeguard personnel; to prevent unauthorized access to equipment, installations, material, and documents; and to safeguard them against espionage, sabotage, damage, and theft. (JP 1-02).

**protected frequencies**

Those friendly frequencies used for a particular operation, identified and protected to prevent them from being inadvertently jammed by friendly forces while active electronic warfare operations are directed against hostile forces. These frequencies are of such critical importance that jamming should be restricted unless absolutely necessary or until coordination with the using unit is made. They are generally time-oriented, may change with the tactical situation, and must be updated periodically. (JP 1-02).

**psychological operations**

Planned operations to convey selected information and indicators to foreign audiences to influence their emotions, motives, objective reasoning, and ultimately the behavior of foreign governments, organizations, groups, and individuals. The purpose of psychological operations is to induce or reinforce foreign attitudes and behavior favorable to the originator's objectives. (JP 1-02).

**radio deception**

The employment of radio to deceive the enemy. Radio deception includes sending false dispatches, using deceptive headings, employing enemy call signs, etc. (JP 1-02).

**radio frequency countermeasures**

Any device or technique employing radio frequency materials or technology that is intended to impair the effectiveness of enemy activity, particularly with respect to precision guided weapons and sensor systems. (JP 3-13.1).

**signal operation instructions**

A series of orders issued for technical control and coordination of the signal communication activities of a command. (JP 1-02).

**signals intelligence**

(1) A category of intelligence comprising either individually or in combination all communications intelligence, electronics intelligence, and foreign instrumentation signals intelligence, however transmitted. (2) Intelligence derived from communications, electronics, and foreign instrumentation signals. (JP 1-02).

**spectrum management**

Planning, coordinating, and managing joint use of the electromagnetic spectrum through operational, engineering, and administrative procedures, with the objective of enabling

electromagnetic systems to perform their functions in the intended environment without causing or suffering unacceptable interference. (JP 1-02).

**taboo frequencies**

Any friendly frequency of such importance that it must never be deliberately jammed or interfered with by friendly forces. Normally these frequencies include international distress, stop buzzer, safety, and controller frequencies. These frequencies are generally long standing. However, they may be time-oriented in that, as the combat or exercise situation changes, the restriction may be removed. (JP 1-02).

**thermobarics**

Encompasses a range of different types of warheads from fuel-air explosives, which release a cloud of flammable material and detonate it, to metallized explosives whose expanding fireball takes in oxygen from the air. What they have in common is that they produce blast which has a lower overpressure but a longer duration than normal condensed explosives. In effect it is a shove rather than a punch: a thermobaric explosion does not smash a hole in a wall, it pushes the wall over.