CHAIRMAN OF THE JOINT CHIEFS OF STAFF INSTRUCTION

J-6 CJCSI 3320.01C
DISTRIBUTION: A, B, C, JS-LAN, S 22 February 2011

ELECTROMAGNETIC SPECTRUM USE IN JOINT MILITARY OPERATIONS

References: See Enclosure B.

1. Purpose. In accordance with (IAW) Enclosure B, reference a, this instruction issues policy and guidance for planning, coordinating, and controlling electromagnetic spectrum (EMS) use in joint military operations. Additionally, it develops and implements joint doctrinal concepts and associated operational procedures to achieve interoperability of information technology and National Security Strategy (NSS) capabilities employed by U.S. military forces, often in joint operations and, where required, with other U.S. government departments and agencies and Coalition partners. References a through s are provided for further reading. The EMS is also referred to as "spectrum" or "the spectrum" in this document.

2. Cancellation. CJCSI 3320.01B, 1 May 2005, is canceled.

3. Applicability. This instruction applies to the Joint Staff, Services, combatant commands, U.S. elements of combined commands, Defense agencies, and joint activities.

4. Policy. Access to the EMS is vital to Department of Defense (DOD) operations worldwide. This publication identifies basic considerations for operating spectrum-dependent (S-D) systems/equipment in a joint military and civil environment.

a. Joint Spectrum Environment. Military operations rely heavily on equipment using the EMS, a finite yet vital resource that is currently constrained by the technologies that access it. The rapid growth of sophisticated weapons systems, as well as intelligence, operations, and communications systems, greatly increases demand for EMS access. Lack of proper, preplanned EMS coordination and consideration of electromagnetic environmental effects (E3) will have an adverse effect upon friendly but competing users. EMS availability/supportability is further constrained by national legislation designed to protect the rights of sovereign governments by

requiring approval prior to transmission in any portion of the spectrum that lies within a particular country's national borders. In joint military operations, EMS requirements may exceed the amount of spectrum resources available in a given electromagnetic operational environment (EMOE). As a result, efficient management, control, and use of the EMS are essential to ensure operations are conducted with minimal unintentional electromagnetic interference (EMI) and without negative E3. Increased demand for commercial wireless services is further exacerbating the problem. Both nationally and internationally, the spectrum currently allocated to government services (including military use) is being reallocated to satisfy commercial demands for advanced wireless services. Joint and combined force operations must also consider the needs of Coalition forces in future contingencies. Therefore, an effective spectrum management structure is required not only to satisfy spectrum needs of military users but also to coordinate with host nations (HNs) to facilitate effective use of this finite resource.

b. Electromagnetic Spectrum Planning, Coordination, and Control. To use the spectrum successfully, all users must work together by exchanging vital spectrum information from the beginning of the joint planning process through an approved DOD spectrum management tool. Primarily, personnel assigned to the Operations Directorate of the Joint Staff (J-3), Intelligence Directorate of the Joint Staff (J-2), Strategic Plans Directorate (J-5), and Communications Directorate of the Joint Staff (J-6) plan, coordinate, and control joint military use of the EMS. To minimize unacceptable EMI among all emitters and receivers and to address E3 issues such as hazards of electromagnetic radiation hazards (RADHAZ) in joint operations, EMS planning, coordination, and control must all work together. Additionally, automated spectrum operations systems at the joint and component levels require vertical and horizontal interoperability.

c. Concept of Control. The supported joint force commander (JFC) or commander, joint task force (CJTF) holds the authority for assigning frequencies to users, usually through the joint frequency management office (JFMO) or joint spectrum management element (JSME). The JFMO or JSME may on occasion delegate frequency assignment authority to subordinate commands, decentralizing the management of the EMOE. Authority to assign use of a specific spectrum resource (use of allotment plans developed by the JFMO or JSME) should be delegated to the lowest level of command possible, consistent with the principles of sound spectrum management, spectrum use considerations, concept of operations, and priority of mission functions detailed in the respective Service or joint publications. Subordinate commands given authority for supporting spectrum requirements will make frequency assignments within the constraints imposed by higher authorities and report changes in spectrum assignment information to the JFMO or JSME.

d. Spectrum Conflicts. To ensure critical frequencies and S-D systems/equipment are protected from unintentional EMI due to friendly operations, the JFMO/JSME will perform an interference analysis of all spectrum requests against existing frequency assignments to identify and deconflict potential interference (to include RADAR deconfliction) before making a new assignment. As new requirements are identified, situations of conflicting or competing spectrum use will occur. Conflicts within a primary functional area should be resolved at the lowest possible level by CJTF, JFC or JFMO.

e. Joint Spectrum Assignment Planning. Planning for the use of the spectrum resource and assignment of spectrum management responsibilities must be fully integrated into the Joint Operation Planning and Execution System (JOPES) process. Review the JOPES when planning for use of the spectrum resource and assignment of spectrum management responsibilities. The complexity of effective joint spectrum use and management requires advanced planning for scenarios of expected operations. Each joint and subordinate component command must establish planning procedures to address all S-D systems/equipment used in support of an operations plan (OPLAN) and any other requirements of friendly forces that impact the use of the EMS. Spectrum managers and EW planners must be fully integrated into the planning process at the initial and subsequent planning stages. Additionally, planning must be done in a consistent manner with each joint command. Without advanced spectrum-use planning, the operational constraints from EMI and RADHAZ may cause a severe limitation to rapid deployment and employment of forces.

f. Electronic Warfare (EW) Integration. The J-6 JFMO/JSME, in coordination with the EW officer (EWO) and in support of the EW Cell, typically will publish, distribute, and maintain a joint restricted frequency list (JRFL) based on inputs from the J-2, J-3, and J-6. The J-3 is responsible for the overall OPLAN within the EMOE and must approve the coordinated JRFL prior to its release. For conflicting or competing EMS use that affects S-D systems/equipment across more than one functional area, the EW cell examines requirements and attempts to resolve coordination issues with JFMO or JSME. If resolution is impossible at this level, the matter is elevated to JFC or designee to make the final determination.

5. Definitions. See Glossary.

6. Responsibilities. See Enclosure A.

7. Summary of Changes. This instruction has been updated with procedures, policy, and terminology to align with current defensive posture and emerging technology in the joint environment. Responsibilities, references, contact information and glossary have been updated.

8. Releasability. This instruction is approved for public release; distribution is unlimited. DOD components (to include the combatant commands), other federal agencies, and the public may obtain copies of this instruction through the Internet from the CJCS Directives Home Page -- http://www.dtic.mil/cjcs_directives/index.htm.

9. Effective Date. This instruction is effective upon receipt.

For the Chairman of the Joint Chiefs of Staff:

WILLIAM E. GORTNEY
VADM, USN
Director, Joint Staff

Enclosures:
A -- Responsibilities
B -- References
GL -- Glossary

DISTRIBUTION

Distribution A, B, C, and JS-LAN plus the following:

	Copies
Assistant Secretary of Defense (Networks and Information Integration)/DOD Chief Information Officer	2
Director of Central Intelligence	2
President, National Defense University	2
Commandant, Armed Forces Staff College	2
Commandant, Army War College	2
President, Naval War College	2
President, Air War College	2
President, Marine Corps University	2
Commander, Joint Spectrum Center	2
Commander, Joint Warfighting Center	2
Director, Joint Information Operations Warfare Center/ Joint Electronic Warfare Cell	2

(INTENTIONALLY BLANK)

ENCLOSURE A

RESPONSIBILITIES

1. Chairman of the Joint Chiefs of Staff will:

a. Provide policy oversight on development of a joint standard for exchange of spectrum assignment data.

b. Identify, assess, and recommend measures to ensure that EMS use is mutually supporting and effective in joint and combined operations.

c. Define joint policy and procedures for software-defined radio (SDR) waveforms, management, and coordination.

d. Establish policy and guidelines for spectrum management of emerging technology such as spread spectrum, ultra wideband, Bluetooth, etc.

e. Define a spectrum operations data standard that will support current operations and the global information grid (GIG). Spectrum data standards are defined in Military Communications Electronics Board (MCEB) Publication 7 (Current Spectrum Data Standard) and MCEB Publication 8 (Emerging Technology Standard).

2. Combatant Commanders (CCDRs) will:

a. Establish command-specific policy and guidance for the management and use of the EMS, including the preclusion of radiation hazards that uniquely apply to their area of responsibility (AOR).

b. Establish a standing frequency management structure, to include a JFMO or JSME, and procedures to support planned and ongoing operations. Specific actions will be taken to:

(1) Ensure OPLANs and concept plans (CONPLANs) address coordination among forces using the EMS to enable effective exchange of information, eliminate duplication of effort, achieve mutual support, and minimize friendly EMI.

(2) Ensure plans address any necessary augmentation of the JFMO or subordinate JTFs to support the spectrum operations effort.

(3) Resolve user conflicts not resolved at a lower level.

(4) Maintain close contact with appropriate foreign military forces and civil communication administrations to ensure that mutual spectrum support is considered in combined planning, operations, training and exercises.

c. Function as the controlling authority for the joint communications electronics operation instructions. Provide guidance and establish procedures for using joint automated communications-electronics operating instructions (CEOI) software (JACS) when developing and generating a joint communications-electronics operating instruction (JCEOI).

d. Establish procedures and policies for the safeguarding, use, and transfer of SDR waveforms. Function as controlling authority for SDR waveforms and the waveform library within the AOR. Maintain the library of SDR waveforms for the specific mission area. Establish policies and procedures on which nations' waveforms can be shared. Receive new waveforms from host nations and allied and/or Coalition forces and transfer waveforms with host, allied, and Coalition forces based on existing policy. Provide maintenance and distribution of current and future waveforms. Facilitate the transfer, manually or electronically, of waveforms for allied and Coalition nation requests. Receive and process requests for waveform modification of existing waveforms and addition of new waveforms into the library.

e. Take measures (e.g., identifying susceptibilities, quantifying electromagnetic environments (EME), evaluating risks associated with operating procedures, and establishing tailored emission control instructions) to ensure that RADHAZ effects on munitions and impacts of positioning, navigation, and timing (PNT) interference on C2 and intelligence, surveillance, and reconnaissance (ISR) assets are resolved during the planning of joint or combined operations or training exercises.

3. Combatant command/J-6 (JFMO or JSME by delegation) will:

a. Exercise or delegate frequency assignment authority.

b. Maintain the common frequency database necessary for planning, coordinating, and controlling spectrum use. The frequency database should contain all communication and noncommunication spectrum emitters and receivers. Examples of such emitters are RADARS, unmanned vehicles, and sensors.

c. Identify, analyze, and evaluate potential spectrum use conflicts and EMI.

d. Develop and distribute spectrum usage plans for particular frequency bands, as appropriate.

e. Provide administrative and technical support for military spectrum use.

f. Participate as a member of the Electronic Warfare Cell (EWC).

(1) Combine inputs received from J-2, J-3, and J-6 to develop a proposed JRFL and submit it to the J-3 for approval.

(2) Periodically update and distribute the JRFL. Assist and coordinate with the J-3 for the resolution and deconfliction of spectrum conflicts.

g. IAW combatant command/J-5 guidance, coordinate military use of the EMS with the host nations EMS authority, U.S. Embassy Defense Attaché Office of Military Cooperation, Friendly Forces Coordination Cell, and other relevant offices when appropriate.

h. Be the focal point for inclusion of spectrum use considerations in the communications annex of OPLANs and CONPLANs.

i. Receive reports and analyze and attempt to resolve incidents of unacceptable EMI IAW Joint Spectrum Interference Resolution (JSIR) Program Guidance found in CJCSM 3320.02. Act as the focal point for requesting interference resolution support. Provide guidance for resolving radio frequency interference. Report all EMI incidents IAW CJCSM 3320.02.

j. Perform the duties required to manage the JCEOI until the JTF J-6 is stood up.

NOTE: Within the bounds of proper classification, the finished JCEOI will be shared with interagency participants in a given operation with the approval of the local commander.

k. Assist the combatant command/J-3 in resolving EMI and electromagnetic radiation hazard issues and in requesting assistance from the Joint Spectrum Center (JSC).

l. Provide guidance and procedures for post-conflict spectrum management transitions.

m. Coordinate, manage, and maintain SDR radios.

n. Use the JTF Spectrum Management Lifecycle as described in CJCSM 3320.01 and JSC-HDBK-05-00 to most effectively perform guidance set forth in this section.

4. Combatant command/J-3 will:

a. Provide the concept of operations.

b. Establish the priority of mission functions.

c. Provide spectrum usage considerations to combatant command/J-6 for inclusion in the communications annex of OPLAN.

d. Establish the joint force commander's electronic warfare staff (JCEWS) or EWC IAW JP 3-13.1. Resolve internal spectrum conflicts (J-3 systems) that the JFMO is unable to resolve. When designated by the commander, resolve coordination issues that JFMO cannot perform.

e. Provide and validate JRFL inputs; approve consolidated JRFL.

f. Identify and resolve potential electromagnetic radiation hazards to fuel, personnel, and ordnance. Act as the focal point for requesting assistance from the JSC.

g. Be the decision-making authority for the priority of systems when there are insufficient EMS resources to support them all.

5. Combatant command/J-2 will:

a. Coordinate with the EWC and assess and provide Combatant Commander/J-6 with prioritized spectrum usage/request requirements that support intelligence operations.

b. Resolve internal spectrum usage/request conflicts (J-2 systems).

c. Participate in multifunctional user spectrum assignment conflict resolution.

d. Provide JRFL input to the JFMO. Inputs to the JRFL must be prioritized, realistic, and contain necessary frequency data to keep from impairing operational communications missions.

e. After considering security sensitivities, and in coordination with the Director, National Security Agency (NSA) and the national signals intelligence (SIGINT) authority, coordinate friendly and hostile spectrum use data with the EWC, JFMO, and/or JSME IAW CJCSM 3320.01.

f. Include spectrum use considerations in the communications annex of the OPLAN.

g. Assist the Combatant Commander/J-6 in determining the sources of any unacceptable EMI or other persistent and recurring interference.

6. Combatant command/J-5 will: Establish preplanned procedures and instructions for the negotiation of military use of the spectrum with any nation involved in a joint or combined military operation or within its territory where U.S. forces may be operating where procedures do not already exist.

7. CJTF will:

a. For operations within a combatant command AOR, adhere to the CCDR EMS use policy.

b. Work with the combatant command staff if modifications are necessary for a specific EMS use situation.

c. For operations outside a CCDR AOR, assume the responsibilities listed for the CCDR in paragraph 2 of this enclosure.

d. Coordinate with the supporting CCDRs to determine what functions their staffs must undertake to control use of the electromagnetic spectrum and what outside support is available.

e. Establish a JSME.

8. JTF/J-6 will:

a. Establish a JTF JSME that supports the policy and guidance set forth by the combatant command. When the JSME has been delegated, items defined within paragraph 3 of this enclosure should be adhered to. The JSME will represent the JFMO and assume delegated responsibilities.

b. Coordinate with the JTF/J-3 to identify JTF nets to be included in the JCEOI and provide those nets to the JSME.

c. Assist the EWC in integrating EW activity into operations to develop an effective execution plan within of the EMOE.

d. Develop and maintain the JRFL. Update the JRFL as required.

e. Participate in the EWC as a member. Provide assistance to the EWC in EW deconfliction processes, as needed.

f. Assist the JSME with coordination of component command resolution of reported instances of interference or disruption.

g. Perform the duties required for the JCEOI IAW CJCSM 3320.03.

h. Report incidents of unacceptable EMI IAW Joint Spectrum Interference Resolution (JSIR) Program Guidance found in CJCSM 3320.02.

9. JTF/J-1 will: Coordinate all personnel augmentation for the JSME and ensure these augmentees are added to the time-phased force and deployment data (TPFDD).

10. JTF/J-2 will:

a. Participate (through the EWC) in multifunctional user EMS-use conflict resolution.

b. Assess intelligence needs and provide the J-6 with prioritized EMS-use requirements for intelligence collections.

c. Participate in multifunctional user, spectrum-use conflict resolution.

d. Provide JRFL input.

e. Provide the JSME with available adversary EMS-use data IAW applicable releasability constraints.

f. Assist the J-6 and/or JSME in determining sources of any unacceptable EMI or other persistent and recurring interference.

11. JTF/J-3 will:

a. Provide the concept of operations.

b. Establish the priority of mission functions.

c. Provide spectrum usage considerations to JTF/J-6 for inclusion in the communications annex of OPLAN.

d. Establish the EWC IAW JP 3-13.1.

e. Resolve internal EMS conflicts (J-3 systems) that the JFMO is unable to resolve. When designated by the commander, resolve coordination issues that

JFMO cannot perform. Provide and validate JRFL inputs, and approve consolidated JRFL.

f. Identify and resolve potential electromagnetic radiation hazards to fuel, personnel, and ordnance. Act as the focal point for requesting assistance from the JSC.

g. Be the decision-making authority for the priority of systems when there are insufficient EMS resources to support them all.

h. Coordinate with the JTF/J-6 to identify and validate JTF nets to be included in the JCEOI.

12. Services will:

a. Ensure that personnel assigned to the CCDR and JFC and/or JTF frequency management billets are properly trained and have adequate security clearances to operate in the joint environment prior to arrival.

b. Equip and train frequency management personnel to operate approved joint spectrum management tools in order to plan, coordinate, and control electromagnetic spectrum use at the Service, CCDR, JFMO, and JSME levels. Provide regular periodic and refresher training to spectrum management personnel on new spectrum management automated tools, DOD spectrum management policy updates, new spectrum management techniques, and procedures and future technology.

c. Ensure that S-D systems/equipment/ordnance developed for use in the joint, combined, and Coalition EMOE will function without EMI and RADHAZ.

13. Defense agencies and other joint activities will:

a. Establish internal policy and procedures consistent with this instruction.

b. Include spectrum use E3 safety-related considerations in the JOPES.

14. Director NSA/Chief, Central Security Service. As principal SIGINT and information security (INFOSEC) adviser to the Secretary of Defense, Director of Central Intelligence, and Chairman of the Joint Chiefs of Staff, is responsible for:

a. Executing the INFOSEC responsibilities of the Secretary of Defense in support of electromagnetic spectrum use.

b. Providing SIGINT support for spectrum use efforts of CCDRs and other commanders designated by the Chairman of the Joint Chiefs of Staff IAW their expressed formal requirements.

c. Provide target and related frequency data and JRFL input to JSME to ensure integration of intelligence requirements into overall EMS operations plan.

15. Commander, JSC, under the operational direction of the Joint Staff/J-6 will:

a. Develop, maintain, and distribute electromagnetic compatibility (EMC) data, spectrum engineering tools, and EMC analysis models.

b. Provide spectrum management, interference resolution, E3 support (including emitter to ordnance deconfliction), and direct support teams to CCDRs and JTF commanders.

c. As requested, review E3 and spectrum management aspects of OPLANs.

d. Develop and manage a DOD-wide standard joint spectrum management system for planning, coordinating, and controlling electromagnetic spectrum use in joint military operations. Assist the Services in developing and maintaining interoperability between joint and Service spectrum management tools.

e. Develop, distribute, and maintain E3 deconfliction tools for use by joint forces.

16. EMS users will:

a. Obtain frequency use authorization for each use of the EMS through their appropriate joint force component.

b. Ensure frequencies and waveforms are used as assigned, and operate S-D systems/equipment according to equipment certification and frequency assignment parameters.

c. Coordinate any need to exceed or operate outside the parameters authorized through the appropriate joint force component.

d. Ensure users properly maintain S-D systems/equipment to preclude unintentional violation of authorized spectrum use parameters.

e. Report incidents of unacceptable EMI and RADHAZ to the appropriate joint force component, the joint force JSME, and JSC for resolution support. Users should attempt to resolve interference at the lowest level of responsibility and within the specified command guidelines before elevating to the JSC.

17. Acquisition Managers will:

a. Submit, through appropriate channels to the MCEB, requests for a spectrum supportability assessment as early as possible prior to the development or procurement of any S-D systems/equipment or system and fully address MCEB guidance and recommendations. Requests for spectrum supportability assessments shall include identification of those HNs into which deployment is likely or planned (reference c). This applies to all equipment that requires the use of the EMS, including systems that use global positioning systems.

b. Initiate HN coordination before contracting for a system's full-scale development.

c. Conduct Spectrum Supportability Risk Assessment (SSRA) before contracting for the purchase and fielding of S-D systems/equipment.

(INTENTIONALLY BLANK)

ENCLOSURE B

REFERENCES

a. DODD 4630.05 series, 5 May 2004, "Interoperability and Supportability of Information Technology (IT) and National Security Systems (NSS)"

b. DODD 3222.3 series, 8 September 2004, "DoD Electromagnetic Environmental Effects (E3) Program)"

c. DODI 4650.01 series, 9 January 2009, "Policy and Procedures for Management and Use of the Electromagnetic Spectrum"

d. DODD 5000.01 series, 12 May 2003, "The Defense Acquisition System"

e. DODD 5100.35 series, 10 March 1998, "Military Communications-Electronics Board"

f. CJCSI 3210.03 series, 17 September 2008, "Joint Electronic Warfare Policy"

g. CJCSI 3213.01 series, 17 July 2008, "Joint Operations Security"

h. CJCSI 3320.02 series, 15 October 2010, "Joint Spectrum Interference Resolution (JSIR) Procedures"

i. CJCSM 3320.01 series, 10 August 2009, "Joint Operations in the Electromagnetic Battlespace"

j. CJCSI 3100.01 series, 12 December 2008, "Joint Strategic Planning System"

k. Joint Publication (JP) 1-02, 8 November 2010, "Department of Defense Dictionary of Military and Associated Terms"

l. JP 3-13, 25 February 2006, "Information Operations"

m. JP 3-13.1, 25 January 2007, "Electronic Warfare"

n. MIL-STD-461F, 10 December 2007, "Requirements for the Control of Electromagnetic Interference"

o. MIL-STD-464, 1 December 2010, "Electromagnetic Environmental Effects Requirements for Systems"

p. CJCSI 3320.03 series, 19 November 2007, "Joint Communications-Electronics Operating Instructions"

q. Military Communications Electronics Board (MCEB) Publication 7, 30 June 2005, "Frequency Resource Record System (FRRS) Standard Frequency Action Format (SFAF)"

r. Military Communications Electronics Board (MCEB) Publication 8, 2 March 2009, "Standard Spectrum Resource Format (SSRF)"

s. JSC-HDBK-05-001, "The Joint Spectrum Management Handbook"

GLOSSARY

PART I -- ABBREVIATIONS AND ACRONYMS

AOR	area of responsibility
C2	command and control
CEOI	Communications-Electronics Operation Instructions
CJCS	Chairman of the Joint Chiefs of Staff
CJCSI	Chairman of the Joint Chiefs of Staff Instruction
CJCSM	Chairman of the Joint Chiefs of Staff Manual
CJTF	commander, joint task force
COCOM	combatant command (command authority)
CONPLAN	concept plan
DOD	Department of Defense
E3	electromagnetic environmental effects
EA	electronic attack
EMC	electromagnetic compatibility
EME	electromagnetic environment
EMI	electromagnetic interference
EMOE	electromagnetic operational environment
EW	electronic warfare
EWC	electronic warfare cell
FRRS	Frequency Resource Record System
GIG	global information grid
HQ	headquarters
IA	information assurance
IAW	in accordance with
INFOSEC	Information Security
IO	information operations
ISR	intelligence, surveillance, and reconnaissance
J-1	Joint Staff Manpower and Personnel Directorate
J-2	Joint Staff Intelligence Directorate
J-3	Joint Staff Operations Directorate
J-4	Joint Staff Logistics Directorate
J-5	Joint Staff Plans and Policy Directorate

J-6	Joint Staff Command, Control, Communications, and Computer Systems Directorate
JACS	Joint Automated Communications-Electronics Operation Instructions (CEOI) System
JCEOI	Joint Communications-Electronics Operating Instructions
JCS	Joint Chiefs of Staff
JFC	joint force commander
JCEWS	joint force commander's electronic warfare staff
JFMO	Joint Frequency Management Office
JOPES	Joint Operation Planning and Execution System
JP	Joint Publication
JPO	Joint Program Office
JRFL	joint restricted frequency list
JSC	Joint Spectrum Center
JSIR	Joint Spectrum Interference Resolution
JSME	Joint Spectrum Management Element
JTF	joint task force
MCEB	Military Communications-Electronics Board
NSA	National Security Agency
NSS	National Security Strategies
OPLAN	operations plan
RADHAZ	radiation hazard
S-D	spectrum dependent
SDR	software-defined radio
SFAF	Standard Frequency Action Format
SIGINT	signals intelligence
SSRA	spectrum supportability risk assessment
TPFDD	time-phased force and deployment data

PART II -- DEFINITIONS

electromagnetic compatibility -- The ability of systems, equipment, and devices that use the electromagnetic spectrum to operate in their intended operational environments without suffering unacceptable degradation or causing unintentional degradation because of electromagnetic radiation or response. It involves the application of sound electromagnetic spectrum management; system, equipment, and device design configuration that ensures interference-free operation; and clear concepts and doctrines that maximize operational effectiveness. (JP 1-02.)

electromagnetic environmental effects -- The impact of the electromagnetic environment upon the operational capability of military forces, equipment, systems, and platforms. It encompasses all electromagnetic disciplines, including electromagnetic compatibility and electromagnetic interference; electromagnetic vulnerability, electromagnetic pulse, electronic protection, hazards of electromagnetic radiation to personnel, ordnance, and volatile materials; and natural phenomena effects of lightning and precipitation static. Also called E3. (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 information operation, or unintentionally, as a result of spurious emissions and responses, intermodulation products, and so forth. Also called EMI. (JP 1-0.)

electromagnetic operational environment -- The electromagnetic operational environment is comprised of the background electromagnetic environment (EME) and the friendly, neutral, and adversarial electromagnetic order of battle (EOB) within the electromagnetic (EM) area of influence associated with a given area of responsibility (AOR). Also called EMOE.

electronic warfare cell -- The organization established to organize, execute, and oversee joint and allied use of electronic warfare (EW) assets and capabilities and manage the deconfliction of the electromagnetic spectrum before, during, and immediately after the onset of contingencies. Functions include planning and executing the EW thread of the commander's operational campaign plan, EW targeting, and managing the joint restricted frequency list. Also called EWC.

electronic warfare -- Any military action involving the use of electromagnetic and direct energy to control the electromagnetic spectrum or to attack the enemy. Also called EW. (JP 1-02.)

frequency assignment -- Authorization given by an administration, or other authority, for a radio station or other emitter to use a specific frequency under specified conditions.

global information grid -- The global information grid is 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. The global information grid 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. Also called GIG.

hazards of electromagnetic radiation to ordnance -- Hazards associated with an electromagnetic field of sufficient intensity to induce currents or voltages of sufficient magnitude to initiate electro-explosive devices or other sensitive explosive components of weapon systems, ordnance, or material. Also called HERO.

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. Actions taken to affect adversary information and information systems while defending one's own information and information systems. Also called IO. (JP 3-13.)

joint force commander -- Combatant Commander, subunified commander, or joint task force commander authorized to exercise combatant command (command authority) or operational control over a joint force designated by the President or Secretary of Defense. Also called JFC. (JP 1-02.)

Joint Commanders Electronic Warfare Staff -- The joint force commanders (JFCs) EW staff (JCEWS) (headed by the command EWO) develops the EW portion of OPLANs, CONOPS, and OPORDS; monitors EW operations and activities; and coordinates joint EW

training and exercises. It also focuses on potential contingency areas within the operational area and develops the information and knowledge necessary to support contingency planning. The JCEWS should be a standing joint planning group with multi-directorate membership consisting of core membership from the combatant command/subordinate unified command headquarters' J2, J3, and J6. JCEWS membership should be a long-term assignment, and members should be designated spokespersons for their respective organizations. When EW is expected to play a significant role in the JFC's mission, a component EW cell (EWC) may be designated as the joint EWC to handle the EW aspects of the operation. The joint EWC may either be part of the JFC's staff, assigned to the J-3 directorate, or remain within the designated component commander's structure. Also called JCEWS. (JP 1-02.)

software-defined radio -- A software radio is a radio whose channel modulation waveforms are defined in software. As adopted by the Software-Defined Radio Forum, the term software-defined radios is used to describe radios that provide software control of a variety of modulation techniques, wide-band or narrow-band operation, communications security functions (such as hopping), and waveform requirements of current and evolving standards over a broad frequency range. The frequency bands covered may still be constrained at the front end, requiring a switch in the antenna system. Software-defined radio is an enabling technology applicable across a wide range of areas within the wireless industry that provides efficient and comparatively inexpensive solutions to several constraints posed in current systems. For example, software-defined, radio-enabled user devices and network equipment can be dynamically programmed in software to reconfigure their characteristics for better performance, richer feature sets, advanced new services that provide choices to the end user, and new revenue streams for the service provider. Software-defined radio is uniquely suited to address the common requirements for communications in the military, civil, and commercial sectors. Also called SDR.

Spectrum-dependent systems -- Spectrum dependent systems include all devices that are intended to radiate or receive electromagnetic energy and include communications, radars, sensors, weapon systems, navigation, satellites, and receive-only systems.

spectrum management -- Planning, coordinating, and managing joint use of the electromagnetic spectrum through operational, engineering, and administrative procedures. The objective of spectrum management is to enable electronic systems to perform their

functions in the intended environment without causing or suffering unacceptable interference. (JP 1-02)

waveform -- A waveform is the representation of a signal as a plot of amplitude versus time. In general usage, the term waveform refers to a known set of characteristics; e.g.. Single Channel Ground and Airborne Radio System (SINCGARS) or Enhanced Position Location Reporting System (EPLRS) "waveforms." In Joint Tactical Radio (JTR) System usage, the term waveform is used to describe the entire set of radio functions that occur from the user input to the radio frequency (RF) output and vice versa. A JTR System "waveform" is implemented as a reusable, portable, executable software application that is independent of the JTR System operating system, middleware, and hardware.