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OPNAV INSTRUCTION 2400.20F

From: Chief of Naval Operations

Subj: ELECTROMAGNETIC ENVIRONMENTAL EFFECTS (E3) AND SPECTRUM SUPPORTABILITY POLICY AND PROCEDURES

Ref: (a) SECNAVINST 2400.1
(b) NTIA Manual of Regulations and Procedures for Federal Radio Frequency Management of May 03 Edition (Sep 06 Rev) (NOTAL)
(c) DOD Directive 4650.1
(d) EBUSOPSOFFINST 4200.1A
(e) ACP 190 US SUPP-1(C) (NOTAL)
(f) USMCEB PUB-7 of 30 Jun 05
(g) MIL-STD-461E of 20 Aug 99
(h) MIL-STD-464A of 19 Dec 02
(i) MIL-HDBK-237D of 20 May 05
(j) DOD Directive 3222.3
(k) DOD Directive 5000.1
(l) DOD Instruction 5000.2
(m) CJCSI 3170.01F of 1 May 07
(n) CJCSM 3170.01C of 1 May 07
(o) CJCSI 6212.01D of 14 Mar 07
(p) CNO Memo 3170 Ser N6N7/5U916222 of 27 May 05
(q) SECNAVINST 5000.2C
(r) N6-NTSP-S 70-8003I of 21 Nov 05
(s) DOD Directive 5100.35
(t) CJCSI 3220.02C of 27 Jan 06
(u) CJCSM 3320.02A of 20 Jan 06
(v) DOD Instruction 6055.11
(w) DOD Defense Acquisition Guidebook of 30 Oct
(x) ASN/RDA Memo, ITD Principles of 1 Aug 05
(y) ANSI C63.14 (NOTAL)
(z) NAVSEA S9040-AA-GTP-010/SSCR (Rev 4) of 1 Jun 98 w/Change 1 of 15 Jan 03
(aa) CJCSM 3212.02B of 15 Oct 03

Encl: (1) Definitions
(2) Procedures for Requesting Spectrum Certification and Frequency Assignments
(3) Recommended Spectrum Supportability (SS) and Electromagnetic Environmental Effects (E^3) Verbiage for Acquisition Documents
(4) FORCEnet Compliance Action List - Electromagnetic Environmental Effects (E^3) and Spectrum Supportability (SS)
(5) Procedures for Implementation of National Emergency Readiness Plan for the Use of the Radio Spectrum

1. Purpose. To establish Navy policy and procedures and assign responsibilities for Electromagnetic Environmental Effects (E^3) and Spectrum Supportability (SS). This instruction implements applicable provisions of references (a) through (aa) and is a substantial revision, which should be reviewed in its entirety.

2. Cancellation. OPNAVINST 2400.20E, OPNAVINST 2450.2, and OPNAVINST 2400.25.

3. Scope and Applicability

a. This instruction establishes Navy policy and assigns responsibilities for achieving SS and ensuring reliable, safe, and mission capable operations of all electrical and Communications-Electronics (C-E) equipment, systems and subsystems, devices, ordnance, and fuels within their intended operational electromagnetic environment (EME), including effects on personnel. E^3 considerations apply to all platforms, systems, subsystems, facilities, weapons, electric or electronic equipment, networks, sensors, fuels, and ordnance, (hereinafter referred to as equipment, systems and platforms) developed, procured, acquired, operated, and maintained by the Navy including Commercial Items (CI) and Non-Developmental Items (NDI).

b. This instruction specifies mandatory actions that are prerequisite to obligating or expending funds for C-E equipment, systems, subsystems, and the specific requirements and procedures for obtaining spectrum certification and frequency assignments.

c. This instruction applies to all United States Navy (NAVY) commands, activities, installations and units, both active and reserve, involved in the research, development, procurement, or operation of any electronic/electrical

equipment, systems and platforms, and any C-E equipment which transmit and/or receive electromagnetic radiation.

d. The Frequency Management Office (FMO) established by the Naval Network Warfare Command (NETWARCOM) per paragraph 6.g of this instruction and in accordance with reference (a) shall support both the Navy and Marine Corps operational activities.

4. Policy

a. Spectrum Supportability

(1) No spectrum-dependent system(s) being developed shall proceed into the System Development and Demonstration Phase without a spectrum supportability determination unless specific authorization to proceed is granted by the Milestone Decision Authority (MDA) in accordance with references (a) through (c).

(2) No spectrum-dependent system shall proceed into the Production and Deployment Phase without such a spectrum supportability determination unless specific authorization to proceed is granted by the Under Secretary of Defense for Acquisition, Technology, and Logistics (USD(AT&L)) or a waiver is granted by the Assistant Secretary of Defense for Networks and Information Integration (ASD(NII)) in accordance with references (a) through (c).

(3) No spectrum-dependent "off-the-shelf" or other non-developmental system shall be purchased or procured without such a spectrum supportability determination in accordance with references (a) through (c).

(4) Unless prior approval is obtained from the local Installation Spectrum Management Office, Government-wide Commercial Purchase Cardholders are not authorized to procure Radio Frequency (RF) or wireless devices in accordance with reference (d).

(5) Commander, Naval Network Warfare Command (NETWARCOM) is hereby authorized to establish a Service Frequency Management Office (FMO) that will have the responsibility for day-to-day Navy and Marine Corps spectrum management activities in accordance with reference (a). This organization shall be at a level thoroughly familiar with and immediately responsive to the requirements of the operating forces.

b. Equipment Spectrum Certification

(1) DD 1494 Applications for Equipment Frequency Allocation shall be initiated and submitted by developers or the procuring organizations as soon as RF bands of operation are identified; shall be updated for each stage of the system life cycle; and shall be updated again whenever changes are planned or made in system electromagnetic radiating characteristics or operational use, including deployment locations.

(2) Funds shall not be obligated for the research, development, procurement, or operation of C-E equipment beyond the concept refinement stage (Milestone (MS) A) until approval of at least a Stage 1 spectrum certification has been obtained from CNO (N6).

(3) DD 1494 submission is not required for the following: electro-optics and fuze development per MCEB-M-006-83(C); or for non-tactical and intra-base radios as defined in MCEB-M-549-78. DD 1494 shall be submitted for approval by CNO (N6) for all other equipment, systems, and platforms and C-E devices, to include GPS (reradiating devices), Commercial-Off-the-Shelf (COTS), CI, and commercial Part 15 devices. (see enclosure (2)).

c. Frequency Assignments

(1) NAVY and MARINE CORPS activities use radio frequencies within the United States and Possessions (US&P) per assignments made by the National Telecommunications and Information Administration (NTIA) in accordance with reference (b). NETWARCOM obtains frequency assignments for NAVY and MARINE CORPS operations in the United States and Possessions (US&P) from the NTIA in accordance with references (a) and (b). For NAVY and MARINE CORPS operations outside the US&P, NETWARCOM obtains frequency assignments from each of the Combatant Command (COCOM) Joint Frequency Management Offices (JFMOs) in accordance with references (c), (e), and (f).

(2) Frequency assignment requests shall be initiated by system developers or testers, via the Systems Commands (SYSCOMs) as soon as experimental (Stage 2) or developmental (Stage 3) spectrum certification is obtained and test site data is known. Frequency assignments for operational (Stage 4) and/or training use will be requested by operational personnel as operational mission location or exercise location dictates, and in accordance with enclosure (2).

(3) C-E transmitting equipment shall not be activated for any purpose without obtaining both spectrum certification and an approved frequency assignment.

d. Electromagnetic Environmental Effects (E^3)

(1) Adequate E^3 control shall be planned and incorporated into all equipment, systems and platforms including CI and NDI. All electrical and electronic systems, subsystems, and equipment, including ordnance containing electrically initiated devices, shall be mutually compatible in their intended electromagnetic environment (EME) without causing or suffering unacceptable mission degradation due to E^3.

(a) Military E^3 specifications, standards, and handbooks stressing interface and verification requirements, establishing operational performance, and specifying developmental and operational test methodologies have been developed and shall be used by all Navy activities for E3 control in accordance with references (g), (h), (i), and (j).

(b) Analytical tools and databases for EMC analysis and E^3 assessment shall be developed and/or maintained to predict, prevent, and correct E^3 deficiencies in Navy systems for the intended operational EME. Where required standards and specifications for Electromagnetic Compatibility (EMC) either do not exist or need correction, they shall be developed or updated promptly. All tools and databases shall be compatible with the future Joint net-centric architecture.

(c) Each command, activity, project or program office, laboratory, and facility is individually accountable for the implementation and enforcement of E^3 requirements and program considerations and the achievement of EMC within its respective area of responsibility.

(2) E^3 control shall apply to all phases of the acquisition process and shall be implemented as early as possible in the requirements definition, conceptual refinement, technology development, system development and demonstration, and production and deployment phases for all equipment, systems, and platforms. Further, E^3 control shall apply to all phases of the Fleet Modernization Program and the Ship Maintenance (SHIPMAIN) program to ensure all ship changes have identified, if applicable, EMC and interference control requirements as integral to design, analysis, test and certification; and the

use, or non use, of the RF spectrum; and to ensure all correctable EMI problems are resolved and fixes are implemented prior to Fleet deployment.

(a) E^3 requirements shall be addressed in program acquisition and requirements documentation as specified in reference (c) and references (j) through (o). E^3 requirements shall be addressed in each phase of the Ship Change Document (SCD) development in accordance with the SHIPMAIN Business Rules.

(b) Where CI and NDI are to be employed, E^3 Program considerations shall be applied to the maximum extent possible and as early as possible in the program, and the Program Manager (PM) shall assess the feasibility and impacts to the use of CI/NDI.

(3) Doctrine, tactics, techniques, and procedures shall consider E^3 factors in the operational employment of equipments, systems, and platforms. Consideration of E^3 factors in modeling and war-gaming ensures awareness of the total EM environment in the evolution of new doctrine, tactics, techniques, and procedures.

(4) A capability for detecting, reporting, solving, and correcting immediate and operationally degrading EMC problems shall be developed and maintained by CNO (N6). This capability shall require procedures for detecting and reporting electromagnetic (EM) incompatibilities and electromagnetic interference (EMI) which degrades combat effectiveness; identifying sources of the problems and determining necessary corrective actions; and rapid acquisition and implementation of required corrective actions.

(5) Waiver authority for EMC requirements resides with CNO (N6). Systems Command (SYSCOM) commanders are authorized to exercise waiver authority for cognizant systems when analyses and/or test data indicate that there is no resultant impact on operational capability or on national or international regulations or treaties.

5. Procedures

a. Spectrum Supportability. Detailed spectrum supportability procedures are included in the FORCEnet Compliance Action List (reference p), and are included as enclosure (4) of this instruction. However, the assessment or

determination of equipment or systems having "spectrum supportability" is based upon, at a minimum, receipt of Equipment Spectrum Certification, Host Nation Spectrum Supportability Assessment (including US&P), and an E^3 Assessment. Reference (q), Table E3T4, provides additional guidance.

b. Spectrum Certification

(1) The spectrum certification process begins with the submission of DD 1494 via the chain of command to CNO (N6F).

(2) See enclosure (2) for an explanation of the Spectrum Certification process.

(3) An approved DD 1494 constitutes an approved spectrum certification.

c. Frequency Assignments

(1) The frequency assignment process for new assignments typically begins after spectrum certification at the Stage 2 or Stage 3 level is approved, and starts with the submission of a standard frequency action format (SFAF) request via the appropriate chain of command.

(2) See enclosure (2) for guidance on submitting and obtaining frequency assignments.

d. E3

(1) Achievement of electromagnetic compatibility in the operational Electromagnetic Environment (EME) is the paramount objective of the Navy's E^3 Program. The primary goals of the Navy E^3 Program are to enhance battleforce performance by controlling E^3 effects to warfighting capability caused by the interaction of the EME with NAVY equipment, systems, platforms, and personnel. This is accomplished with the prevention, correction and mitigation of mission degrading E^3 performance effects.

(2) E^3 control procedures are included in references (g) through (i) and in the FORCEnet Compliance Action List (CAL), reference (p). The FORCEnet CAL for E3 and SS is also included as Enclosure (4) to this instruction.

e. Electronic Attack. When performing Electronic Attack in the Unites States and Canada for Tests, Training, and Exercises implement procedures in accordance with reference (aa).

6. Responsibilities

a. Deputy Chief of Naval Operations (Communication Networks), (CNO (N6)), shall be the Navy SS/E^3/EMP Program Director. The SS/E^3/EMP Program Director shall have an SS/E^3/EMP Program Coordinator (CNO (N6F13)) to plan, implement, and maintain SS, E^3, and EMP Program Management during development and operation of equipment, systems, and platforms. The Navy SS/E^3/EMP Program Coordinator, in coordination with the SYSCOMs, will work with the Joint Spectrum Center, Fleet Combatant Commanders, Type Commanders (TYCOMS), Commander Naval Network Warfare Command (NETWARCOM), Engineering Systems Centers, field activities, laboratories, and other applicable organizations to manage the Navy SS/E^3/EMP Program. CNO (N6) shall:

(1) Provide Navy policy execution guidance, management direction, and coordination for the Navy SS/E^3/EMP Program, and:

(a) Serve as the principal CNO SS/E^3/EMP advocate and coordinate and implement operational SS/E^3/EMP policy.

(b) Sponsor and provide resources for a centralized (core) E^3 Program for Navy equipment, systems, and platforms to eliminate duplication of E^3 programs among system and platform sponsors. This core program shall provide a Fleet responsive capability for detecting, reporting, solving, and correcting immediate and operationally degrading EMC problems experienced by the operating forces in the Fleet. This program shall be called the Shipboard Electromagnetic Compatibility Improvement Program (SEMCIP). SEMCIP also includes upfront E^3 engineering and spectrum supportability assessments and determinations.

(c) Sponsor and provide resources for the development and maintenance of a capability to monitor acquisition programs' compliance with E^3-related requirements.

(2) Provide Navy representation to joint, national, and international E^3-related meetings and forums as required. Ensure foreign E^3 technology, data, and practices are considered for applicability for Navy use and assessed for impact on Navy operations.

(3) Determine current and future RF requirements and develop plans in coordination with the office of the Department of the Navy Chief Information Officer (DON CIO) and the Assistant Secretary of the Navy (Research, Development and

Acquisition) (ASN (RD&A)) to accommodate Navy C-E equipment and systems within appropriate portions of the RF spectrum.

(4) Coordinate cross-mission area efforts with platform/facility sponsors by establishing and chairing a CNO SS/E^3 Integrated Product Team (IPT) with membership from all Warfare and Platform Sponsors to discuss and resolve SS/E^3 issues that cut across program boundaries. Assist the Warfare and Platform Sponsors in assessing the impact of SS/E^3 problems on force-level combat posture and monitor correction of SS/E^3 deficiencies.

(5) Exercises overall authority for EMC waivers.

(6) Perform SS/E^3 reviews of program acquisition and requirements documentation and platforms under development by the Navy to ensure performance requirements are established and met while operating in the intended EME, and that the operation of the equipment, systems, and platforms will not degrade the performance of other equipment, systems, and platforms.

(7) Retain primary responsibility for representation on the Joint Staff's (J6B) Military Communications-Electronics Board (MCEB) Frequency Panel (FP) in accordance with reference (s).

b. The Director of Test and Evaluation and Technology Requirements (CNO (N091)) shall:

(1) Work in conjunction with the Joint Spectrum Center, the Defense Intelligence Agency (DIA), the SYSCOMs, the system user and others, as appropriate, to conduct early independent analyses of potential SS/E^3 issues and review the program manager's resolution of these issues.

(2) Ensure that Test and Evaluation Master Plans (TEMPs) address SS assessments and E^3 testing within the intended operational environment of the item to include storage, training, transportation, staging, and operation in Navy, joint, and international deployment.

(3) Include SS/E^3 assessment and spectrum availability issues as a standard presentation at Operational Test Readiness Reviews.

c. The Director, Capability Analysis and Assessment Division (CNO (N81)) shall:

(1) Ensure applicable Warfare and Platform Sponsor funding is appropriately planned for the prevention and correction of E^3-related deficiencies that degrade the mission and combat effectiveness of equipment, systems, and platforms for which each Warfare Sponsor is responsible, i.e., Amphibious, Surface Combatants, Carriers, Submarines, Aircrafts.

(2) Ensure that Shipboard Electromagnetic Compatibility Improvement Program (SEMCIP) E^3 program funds budgeted by the Deputy Chief of Naval Operations (DCNO) (Fleet Readiness and Logistics) (N4), and the DCNO (Integration of Capabilities and Resources) (N8) for Oceanographer of the Navy (N84), Expeditionary Warfare (N85), Surface Warfare (N86), Submarine Warfare (N87), and Air Warfare (N88) for Carrier Programs, in support of the core N6 resourced SEMCIP program are transferred to CNO (N6F13) for consolidation into the SEMCIP (02M) funding line. CNO (N81) shall also monitor execution to prevent unwarranted migration of programmed E^3 funding.

d. The Head, JROC Branch (CNO (N810)) shall ensure that Initial Capabilities Document (ICD); Capability Development Document (CDD); Capability Production Document (CPD); Acquisition Strategy (AS) or Acquisition Plan; Test and Evaluation Master Plan (TEMP); Information Support Plan (ISP); Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, and Facilities (DOTMLPF) Change Recommendation (DCR); and Joint Capabilities Document (JCD) include the necessary SS/E^3/EMP requirements before being routed through CNO and the Joint Requirements Oversight Committee (JROC) process in accordance with enclosure (3).

e. The Head, Training and Education Requirements Branch (CNO (N127)) shall:

(1) Ensure that a policy is established to direct that all necessary operational personnel be trained in spectrum management, i.e. NEC IT-2301/2302s, etc, and assist CNO (N6F13) and NETWARCOM with the development, maintenance and oversight of a cadre of Navy spectrum management career professionals.

(2) Ensure the inclusion of E^3 control requirements in the appropriate follow-on training involving electronic/ electrical equipment and systems.

(3) Assist Fleet Combatant Commanders (COCOMs) and Force and Type Commanders in incorporating SS awareness and E^3 control into their training programs.

(4) Implement training material developed per reference (r) and support the curriculum and training efforts for applicable CNO sponsored programs. Awareness of the effects on operations or mission capabilities of E^3 deficiencies by all personnel concerned with the design, development, production, test, operational use, and maintenance of equipment, systems and platforms. This awareness shall be attained through:

(a) Training of designers and engineers in the design and production methods and techniques for achieving EMC.

(b) Training of operating and maintenance personnel in field techniques to optimize EMC.

(c) Emphasis on EMC considerations as a portion of basic electronic and electrical engineering techniques.

(d) Inclusion of EMC principles within the training curriculum for acquisition managers.

f. The Deputy Chief of Naval Operations (DCNO) (Fleet Readiness and Logistics) (N4); DCNO (Integration of Capabilities and Resources) (N8) for Oceanographer of the Navy (N84); for Expeditionary Warfare (N85); for Surface Warfare (N86); for Submarine Warfare (N87); for Air Warfare (N88); for Special Programs (N89); and the DCNO (Communication Networks) (N6), shall:

(1) Ensure that Spectrum Supportability and E^3 are required and incorporated in equipment, systems, and platforms for which they are responsible and provide funding in support of the CNO (N6F13) core SEMCIP program for identification and Fleet responsive correction of verifiable E^3 problems affecting cognizant platforms.

(2) Designate and maintain a central point of contact for all SS/E^3 issues who will also participate in a CNO SS/E^3 IPT for the coordination and resolution of cross-mission SS/E^3 problems and issues.

(3) Program funds and manpower to ensure training of Fleet personnel in EMC management, EMI control, and spectrum supportability awareness.

g. Naval Network Warfare Command (NETWARCOM) shall:

(1) Establish a Frequency Management Office (FMO) to act as the Navy and Marine Corps center of excellence for radio frequency and spectrum management. This FMO shall perform spectrum management functions at a level thoroughly familiar with, and immediately responsive to, the requirements of the operating forces and operate sufficiently close to major policy-making offices to facilitate referral of issues requiring consideration by these offices, in accordance with reference (a) and (c).

(2) Publish and maintain a detailed manual of procedures for obtaining spectrum certification and frequency assignments. Additionally, this manual shall contain procedures for spectrum management and the coordination of frequency assignment actions and will be distributed to major shore commands, installation spectrum managers, frequency coordinators, and other requesting activities.

(3) Consolidate ashore spectrum management functions into regional support centers in order to provide more effective spectrum management support to Naval afloat and ashore activities and commands.

(4) Support the CNO (N6 and N6F13) and CMC (HQMC C4) in the formation and implementation of policy and procedures, and overall management and use of the electromagnetic spectrum for the Navy and Marine Corps, including Naval spectrum requirements and priorities during National emergencies. Specifically, NETWARCOM shall perform the following functions in support of CNO (N6 and N6F13) and the CMC (HQMC C4):

(a) Provide representation as requested to DOD, joint, national, and international spectrum management forums.

(b) Support CNO (N6) by providing the principal Navy member to the Joint Staff's (J6B) Military Communications-Electronics Board (MCEB) Frequency Panel (FP) in accordance with reference(s) and paragraph 6.a.7 above.

(c) Procure, coordinate, register, assign, and protect radio frequencies for test and operational use of C-E equipment and systems employed by Navy and Marine Corps commands and activities.

(d) Maintain frequency assignment records, and periodically review all frequency assignments in accordance with references (b) and (f).

(e) Provide SS/E^3 guidance for all research, development, acquisition, and modification of equipment, systems, and platforms.

(f) Advise the Fleet on operational measures and tactics that should be used to exploit the EME and to control EMI degradation of warfighting capability.

(g) Ensure timely review, coordination, and approval of all DD 1494s submitted through the MCEB. This includes coordination and submission of space, radar, and other selected major C-E systems, including extensive modification of nationally approved systems, to the Spectrum Planning Subcommittee (SPS) of the Interdepartment Radio Advisory Committee (IRAC) for review and determination of spectrum supportability at the national level.

(h) Investigate reports of harmful interference involving frequency problems reported per references (t) and (u), to or from equipment and systems and eliminate or mitigate the harmful effects of interference to Naval forces. Where appropriate, resolve interference conditions correctable by frequency reassignment.

(i) Act as the NEC IT-2301/2302 Program Manager to properly assess and authorize NEC IT-2301/2302 placements in coordination with the Navy IT detailer; establish a shore-to-sea career path for the NEC IT-2301/2302 field; and, establish an NEC IT-2301/2302 training program that supports Service specific and Joint military spectrum operations, i.e., Joint Task Force (JTF).

(j) Coordinate Navy and Marine Corps radio frequency spectrum requirements for use during National emergencies and ensure these requirements are adequately documented in the *NTIA National Emergency Readiness Plan (ERP) for the Use of the Radio Spectrum* per reference (b), paragraph 7.3.3 and entered appropriately into the Telecommunications Service Priority for Radiocommuncation (TSP-R). NETWARCOM shall act as the main focal point for coordination of Naval spectrum-related responsibilities during national emergencies. Enclosure (5) provides additional information on the NTIA's ERP and its implementation and responsibilities.

h. Program Executive Officers (PEOs), Direct Reporting Program Managers (DRPMs) and Program Managers (PMs) shall ensure completion of table E3T4 in reference (q) (Electromagnetic

Spectrum Supportability Assessment Factors) prior to MS B. These Electromagnetic Spectrum Supportability Assessment Factors will be approved by ASN (RD&A), or designee, for ACAT I, IA, and II programs, and by the MDA for ACAT III and IV programs. Additionally, the EMC of equipment, systems, and platforms for which they have material acquisition and life cycle support responsibility shall be assessed. PEOs and PMs shall:

(1) Ensure DD 1494s are submitted for all RF spectrum-dependent systems including CI and NDI. Establish safeguards to ensure that spectrum certification is obtained before assuming contractual obligations for system development and demonstration, production and deployment and/or procurement of any C-E equipment. Complete DD 1494 submissions shall be forwarded to the appropriate SYSCOM SS/E^3 office for submission to CNO (N6F13) and NETWARCOM.

(2) Budget for SS and E^3 control to ensure that these requirements are incorporated into all programs as early as possible.

(3) Work jointly to develop and maintain a capability to quantify the EMI degradation of existing force-level warfighting capabilities with the planned introduction of new equipment, systems, and platforms.

(4) Establish a working-level IPT for all Acquisition Category (ACAT) I and ACAT II programs to address Spectrum Supportability and E^3 in accordance with reference (g). For other programs, the IPT can be incorporated into another IPT or similar acquisition forum.

(5) Define SS and E^3 requirements for equipment, systems, and platforms by utilizing this instruction, and references (g) through (i) and (v) through (y).

(6) Ensure compliance with appropriate SS/E^3 requirements that are in an ICD, CDD, CPD, or CRD. Further ensure that the appropriate SS/E^3 requirements and tests for the equipment, systems, networks, weapons, sensors, or platforms are included in any acquisition documentation that is generated at the PM or PEO level, i.e., TEMP, APB, AS, IPS, AoA, STAR, and/or ISP, to include a description of the intended EME in which the systems, networks, weapons, sensors, or platforms will be required to operate.

(7) Participate, as required, in the CNO sponsored SS/E^3 IPT to resolve cross-mission deficiencies.

(8) Ensure that EMC analysis and/or testing are accomplished for all equipment, systems and platforms, to include CI and NDI, and that the program manager incorporates recommendations to ensure safe and electromagnetic compatible operation in the intended operational environment.

(9) Coordinate with the appropriate SYSCOM SS/E^3 office, as required, on spectrum management issues for cognizant equipment, systems, and facilities.

(10) Coordinate with COMNAVSEASYCOM on Shipboard and System EMC Certification test planning, funding, and execution in accordance with reference (z).

(11) All Ship and System Program Managers are directed to implement the Integrated Topside Design (ITD) Principles of reference (x). SYSCOM Commanders and PEOs (with Topside responsibilities) shall execute the ITD process and description along with the Topside Design Data Requirements Worksheet contained in reference (x).

i. Commanders of SYSCOMs shall establish and maintain an engineering capability for preventing, detecting, measuring, analyzing, reporting, and correcting EMI deficiencies and addressing spectrum supportability issues. Specifically, each SYSCOM commander shall:

(1) Ensure that the spectrum certification, frequency assignments, E^3 assessments, and associated approval of waivers are made essential documents in the procurement file for the development and/or acquisition of electrical/electronic equipment and/or C-E equipment, and shall report on compliance with the requirements of this directive during technical review meetings in preparation for Milestone Decision meetings in support of PEOs and PMs.

(2) Participate in the CNO sponsored SS/E^3 IPT to resolve cross-mission deficiencies.

(3) Coordinate with NETWARCOM and the Service FMO on spectrum management issues for cognizant equipment, systems, and facilities.

(4) Develop and issue interface standards and handbooks for achievement and maintenance of E^3 in cognizant equipment, systems, and platforms, consistent with the DOD EMC standards program.

(5) Each SYSCOM commander shall designate and resource a trained spectrum manager as the SYSCOM Spectrum Manager to serve as a central point of contact for all experimental and developmental frequency assignments and requirements across cognizant PEOs and PMs.

(6) Provide participation for cognizant NATO E^3 working groups, to include the Air Electrical and Electromagnetic Considerations (AE) Panel, for planning and establishing technical support requirements in EMC as invited and/or required.

j. COMNAVSEASYSCOM, in addition to those responsibilities assigned in paragraph 7i, shall:

(1) Provide a quick response capability to evaluate and correct EMI degradation reported by the Fleet or Navy shore facilities involving Navy equipment, systems, and platforms.

(2) In support of Strike Force Interoperability, ensure that Strike Force SS/E^3 issues are identified, investigated, and resolved prior to Strike Group deployment.

(3) Provide the lead for Shipboard and System EMC and radiation hazards (RADHAZ) Certification test planning, funding, and execution in accordance with reference (z).

(4) Act as the lead operational spectrum supportability software development and implementation agent for technology initiatives in support of Fleet communications, radar, and electronic warfare capabilities (coordinating with Space and Naval Warfare Systems Command (SPAWARSYSCOM) and Naval Air Systems Command (NAVAIRSYSCOM) as appropriate).

(5) Maintain the Navy Training Systems Plan (NTSP) for the SS/E^3/EMP Program Coordinator, and serve as the Principal Development Agent (PDA) for training material for Navy schools and courses, in coordination with NETWARCOM as appropriate.

(6) Establish EMC-related training requirements for management, engineering, operations, and maintenance personnel

associated with cognizant equipment, systems, and platforms, and incorporate them into reference (r), where appropriate.

(7) Exercise approval authority for the proposed correction of E^3 problems and the acceptance of operational performance degradation or impact for E^3 problems that cannot be corrected within current capabilities or with current resources.

(8) Act as Shipboard and Shore SS/E^3 technical authority to ensure that shipboard and shore SS/E^3 problems are investigated and resolved. Maintain the Navy's central data repository of all ship, submarine, and Strike Force SS/E^3 problems and resolutions.

k. COMNAVAIRSYSCOM, in addition to those responsibilities assigned in paragraph 7i, shall:

(1) Provide quick response capability to evaluate and correct EMI degradation reported by the Fleet involving cognizant Navy equipment, systems, and platforms.

(2) Establish EMC-related training requirements for management, engineering, operations, and maintenance personnel associated with cognizant equipment, systems, and platforms, and coordinate with COMNAVSEASYSCOM to incorporate them into reference (z), where appropriate.

(3) Provide lead on airborne system EMC and radiation hazards (RADHAZ) Certification test planning, funding and execution.

l. Fleet Commanders, Commanders of NAVY installations and activities and all subordinate commands shall promote spectrum awareness and E^3 in the Fleet by:

(1) Ensuring that SS/E^3 is addressed in all Fleet Modernization Programs.

(2) Ensuring SS/E^3 awareness training for assigned personnel.

(3) Ensuring that equipment, systems, and platform maintenance is performed under published EMI control procedures.

(4) Developing and documenting tactics that take into account constraints imposed by electromagnetic degradation of equipment.

(5) Ensuring that radio frequencies used within their areas of responsibility are properly coordinated and authorized and that frequency assignments are kept current in accordance with reference (b).

(6) Ensuring that spectrum certifications and frequency assignments are obtained before buying C-E equipment.

(7) Ensuring that provisions for use of specific radio frequencies by military or nonmilitary tenant activities on their installations are specifically addressed in a host-tenant agreement. Such agreements include specific authority for the commander of the installation to require the tenant activity to cease or modify operation on a specific frequency or to change frequencies, should the need arise.

(8) Designating an installation spectrum manager (ISM) or frequency manager to serve as a central point of contact for all frequency use.

(9) Ensuring that the necessary EMC studies are conducted prior to approval for all requests for installation of commercial mobile service provider equipment on shore installations in accordance with reference (j).

8. Forms and Report Symbols

a. DD 1494 Application for Equipment Frequency Allocation is available for download from the Department of Defense (DOD) Forms website: http://www.dtic.mil/whs/directives/infomgt/forms/formsprogram.htm. The DD 1494, S/N 012-LF 001-4941, is also available from the Navy supply system, per NAVSUP P-2002, the Joint spectrum Center (JSC) website (www.jsc.mil) and it can be obtained from the appropriate SYSCOM SS/E^3 Office or CNO (N6F13).

b. There are no reporting requirements per SECNAV M-5214.1

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DEFINITIONS

Communications-Electronics (C-E):
The specialized field concerned with the use of electronic devices and systems for the acquisition or acceptance, processing, storage, display, analysis, protection, disposition, and transfer of information. In this instruction, C-E systems include communications, radar, navigation, and all other systems which use the electromagnetic spectrum.

Electromagnetic Compatibility (EMC):
The ability of all equipment, systems, and platforms to operate and exist in their intended operational environments without causing or suffering unintentional performance degradation or harmful reactions as a result of electromagnetic interference.

Electromagnetic Environment (EME):
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.

Electromagnetic Environmental Effects (E^3):
The impact of the Electromagnetic Environment (EME) on the operational capability of military forces, equipment, systems, and platforms. It encompasses all electromagnetic disciplines, including Electromagnetic Compatibility (EMC) and Electromagnetic Interference (EMI); Electromagnetic Vulnerability (EMV); Electromagnetic Pulse (EMP); Electro-Static Discharge (ESD); Hazards of Electromagnetic to Radiation (RADHAZ) to Personnel (HERP), Ordnance (HERO), and volatile materials (HERF); and natural phenomena effects of lightning and Precipitation Static (P-Static).

Electromagnetic Interference (EMI):
Any electromagnetic disturbance that interrupts, obstructs, or otherwise degrades or limits the effective performance of electronics/electrical equipment. EMI can be induced intentionally, as in some forms of electronic warfare, or unintentionally, as a result of spurious emissions and responses, intermodulation products, and the like.

Electromagnetic Pulse (EMP):
The electromagnetic radiation from a strong electronic pulse, most commonly caused by a nuclear explosion that may couple with electrical or electronic systems to produce damaging current and

voltage surges. Also called EMP. See also electromagnetic radiation.

Electromagnetic Radiation:
Radiation made up of oscillating electric and magnetic fields and propagated with the speed of light. Includes gamma radiation, X-rays, ultraviolet, visible, and infrared radiation, and radar and radio waves.

Electro-optics:
Those systems and devices which employ a useful combination of optics and electronics for which the carrier wavelength is 0.1 to 100 micrometers (3000 GHz-3000 THz or 3×10^{12} Hertz to 3×10^{15} Hertz).

Equipment Spectrum Certification:
The statement(s) of adequacy received from authorities of sovereign nations after their review of the technical characteristics of a spectrum-dependent equipment or system regarding compliance with their national spectrum management policy, allocations, regulations, and technical standards. Equipment Spectrum Certification is alternately called "spectrum certification."[1]

Frequency Allocation:
(1) A frequency band established by national or international rules and regulations for specific categories of radio services, such as radiolocation, radionavigation, mobile or fixed communications, space telemetry, etc.
(2) As previously used in this instruction, this also was defined as the acknowledgment by Chief of Naval Operations that development and/or procurement of C-E equipment can be supported for operation on a specific frequency or within a band of frequencies within the radio frequency spectrum. In other words, frequency allocation and spectrum certification are synonymous.

Frequency Assignment:
The discrete frequency or frequencies on which C-E equipment or a system is authorized to operate within its allocated frequency band at the location(s) designated and within the constraints of the authorizing assignment.

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[1] Within the United States and its possessions, the requirement for certification of DOD spectrum-dependent equipment is dictated by OMB Circular A-11, Part 2. The NTIA "Manual of Regulations and Procedures for Federal Radio Frequency Management" prescribes procedures and also applies to all equipment or systems employing satellite techniques.

Host Nations (HNs):
Those sovereign nations, including the United States, in which the Department of Defense plans or is likely to conduct military operations with the permission of that nation.

Milestone Decision Authority (MDA):
The designated individual responsible for an acquisition program. The MDA shall have the authority to approve the entry of an acquisition program into the next phase of the acquisition process and shall be accountable for cost, schedule, and performance reporting to higher authority, including Congressional reporting.

Part 15 Device: (also called low-power and non-licensed devices)
In the U.S., Part 15 is an often-quoted section of Federal Communications Commission (FCC) rules and regulations, mainly regarding unlicensed transmissions. It is a part of CFR Title 45 of the Code of Federal Regulations (CFR), and regulates everything from spurious emissions to unlicensed broadcasting. It is cited as 47 CFR §15. For the purposes of this instruction, Part 15 refers to intentional low-power radiators which are governed under Part 15 and are subject to the following stipulations:

- The Navy may develop and operate "Part 15 devices" as long as they conform to sections 7.8, 7.9, and Annex K of reference (b).
- These devices have no vested or recognized right to continued use in any part of the radio frequency spectrum. These devices must accept any interference from any authorized Federal or non-Federal radio system, other non-licensed device, or industrial, scientific, or medical (ISM) equipment, and cannot claim protection.
- Since these devices operate on a non-interference basis, they may not provide sufficient reliability for critical radio communications functions affecting human life or property. Part 15 (non-licensed) devices, however may provide valuable and unique supplemental or expendable radio communications services were needed. To ensure adequate regulatory protection, the Navy should rely only on devices with frequency assignments in the Government Master File as principal Radiocommunication systems for safeguarding human life or property.

Radio Frequency (RF):
A general term applied to electromagnetic frequencies below 3000 GHz (3×10^{12} Hertz). Internationally recognized frequency bands:

Extremely Low Frequency (ELF): Below 3 kHz

Very Low Frequency (VLF): 3-30 kHz

Low Frequency (LF): 30-300 kHz

Medium Frequency (MF): 300-3000 kHz

High Frequency (HF): 3-30 MHz

Very High Frequency (VHF): 30-300 MHz

Ultra High Frequency (UHF): 300-3000 MHz

Super High Frequency (SHF): 3-30 GHz

Extremely High Frequency (EHF): 30-300 GHz

Spectrum-Dependent Systems:
Those electronic systems, subsystems, devices and/or equipment that depend on the use of the electromagnetic spectrum for the acquisition or acceptance, processing, storage, display, analysis, protection, disposition, and transfer of information.

Spectrum Management (SM): (Statutory requirement per Public Law 102-538 and Title 47 U.S.C.)
Planning, coordinating, and managing joint use of the electromagnetic spectrum through operational, engineering, and administrative procedures. The objective of SM is enabling spectrum-dependent systems to perform their functions in the intended environment without causing or suffering unacceptable interference. [JP 1-02]

Note: The process of SM includes both the Application for Equipment Frequency Allocation (DD Form 1494) submission and approval, i.e., spectrum certification and the frequency assignment process.

Spectrum Supportability (SS) and Spectrum Supportability Determination:
The assessment as to whether the electromagnetic spectrum necessary to support the operation of a spectrum-dependent

equipment or system during its expected life cycle is, or will be, available (that is, from the concept refinement phase through developmental and operational testing, to actual operation in the electromagnetic environment). Spectrum Supportability Determination requires:

a) Equipment Spectrum Certification,
b) Host Nation Spectrum Supportability Assessment (including US&P)[2],
c) Electromagnetic Environmental Effects (E3) Assessment.

United States and Possessions (US&P):
Includes the land area, internal waters, territorial sea, and airspace of the United States, including the following:
a. U.S. territories, possessions, and commonwealths; and
b. Other areas over which the U.S. Government has complete jurisdiction and control or has exclusive authority or defense responsibility.

Waiver:
A formal approval, usually written, relinquishing certain construction or performance requirements. In this instruction, waiver refers to the replacement or procurement of electromagnetic radiating or receiving equipments that deviate from the technical characteristics or service band allocations specified in national regulations and policies and international regulations and treaties.

[2] While an actual determination of spectrum supportability for a spectrum-dependent system within a particular country i.e. Host Nation may be possible based upon "spectrum supportability", e.g., equipment spectrum certification comments provided by that host nation, the overall determination of whether a spectrum-dependent system has spectrum supportability is the responsibility of the MDA based upon the totality of spectrum supportability comments returned from those host nations whose comments were solicited.

Procedures for Requesting Spectrum Certification and Frequency Assignments

Equipment Spectrum Certifications

1. Obtaining an approved DD 1494, i.e., Spectrum Certification is the process by which data relative to C-E systems under development or procurement are reviewed, and the system is evaluated for compliance with spectrum management (SM) policies, national and international allocations, regulations, and technical standards. This process will facilitate identifying the necessary EM spectrum and determine if the predicted degree of EMC between existing spectrum-dependent systems in the intended operational EME is satisfactory and/or manageable. Figures 1 and 2 apply.

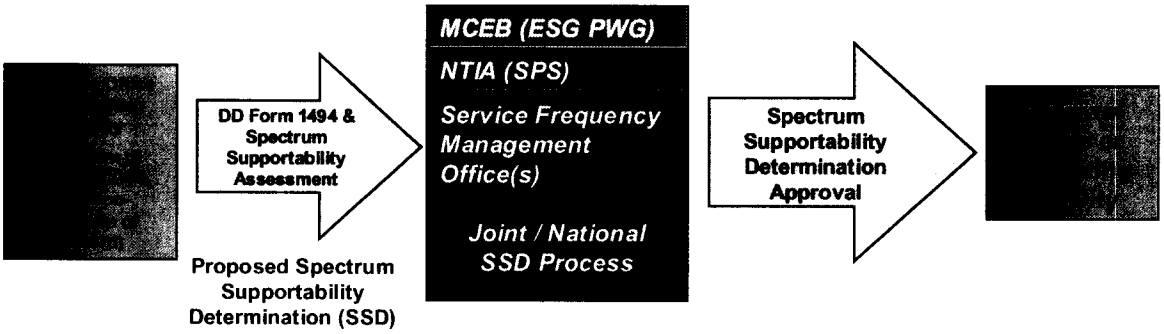


Figure 1
Spectrum Supportability Determination Process Overview

2. An Application for Equipment Frequency Allocation (DD 1494) will be prepared by the Program Manager (or contractor), marked for the correct stage of procurement (Stage 1, 2, 3, or 4), and shall be submitted to CNO (N6F13) and the Navy and Marine Corps Frequency Management Office (FMO) under NETWARCOM via the appropriate SYSCOM SS/E^3 Office for processing:

a. A **Stage 1** DD 1494 is required to be submitted as early as possible during the Concept Refinement stage of acquisition and shall be approved prior to MS A.

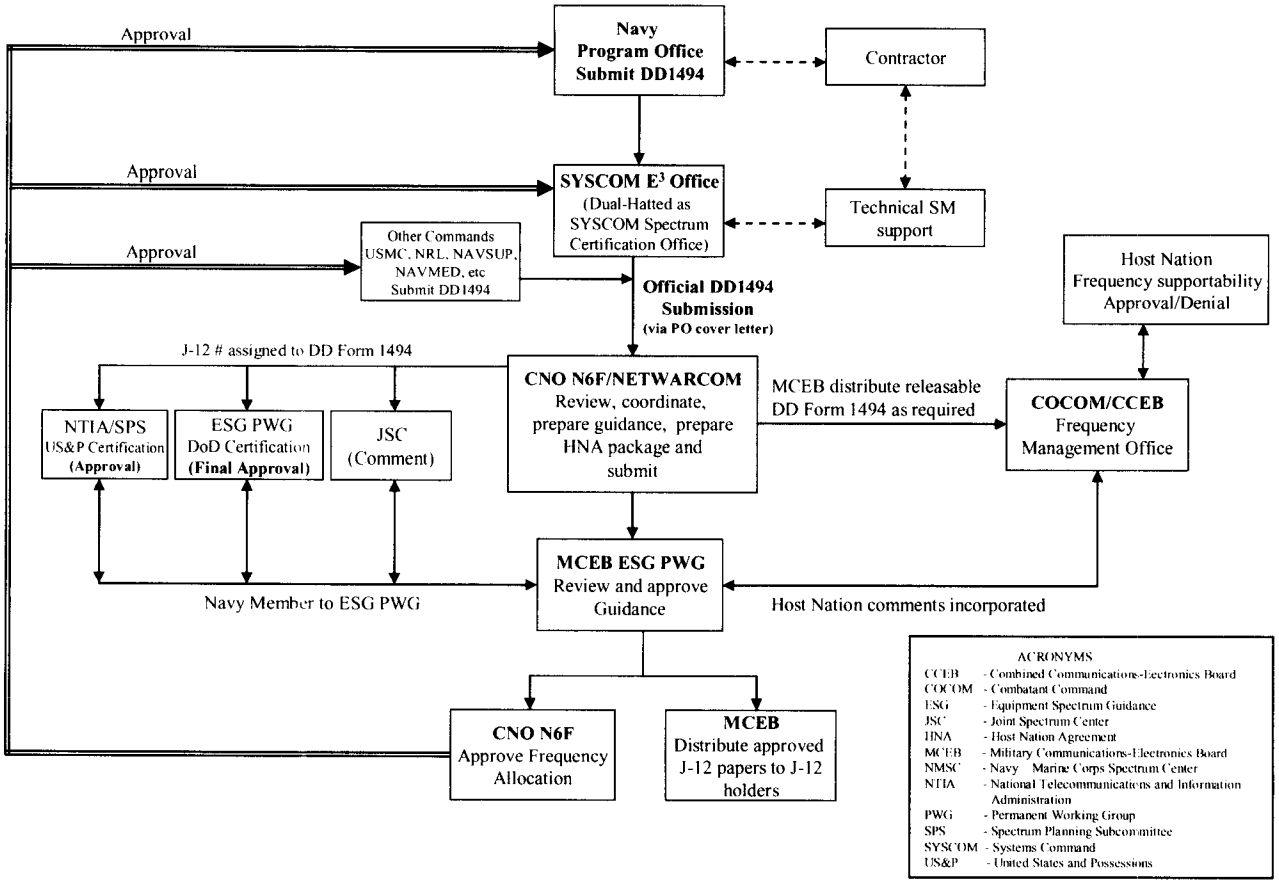


Figure 2
Detailed Navy Spectrum Certification Process

b. A **Stage 2** DD 1494 is required to be submitted to enter the Technology Development phase of the acquisition process, and shall be approved prior to MS B, to include an initial assessment of Host Nation Authorization if appropriate and obtainable.

c. A **Stage 3** DD 1494 is required to be submitted when equipment development progresses to the System Development and Demonstration (SDD) phase of the acquisition process, and must be approved prior to MS C. The Stage 3 should also include an assessment of Host Nation Authorization if appropriate and obtainable.

d. A **Stage 4** DD 1494 is required to be submitted prior to Low Rate Initial Production (LRIP) and must be approved prior to IOC (Initial Operating Capability). A Stage 4 DD 1494 must include a complete assessment of Host Nation Authorization where

the equipment, systems and platforms are intended to be deployed.

e. A Stage 3 (for non-developmental items (NDI)) or Stage 4 (for CI) DD 1494 is required when procurement of commercial equipment, system, or non-developmental items for military use are being planned. This also includes any FCC Part 15 device being planned for Navy use. For all Part 15 devices, a Stage 4 DD 1494 will be submitted in accordance with the above procedures and will include an assessment against reference (b), Annex K criteria. Approval of a DD 1494 for a Part 15 device is contingent upon compliance with reference (b), Annex K requirements, and will be applicable only for use in the United States and Possessions (US&P) on a non-interference basis. Approval for use outside the US&P is normally difficult to obtain, and will be based on formal Host Nation Coordination and approval via the Combatant Commands (COCOMS).

f. A simple letter may be submitted in lieu of a new DD 1494 to request modification to a previous spectrum certification. When a minor change (see below) occurs in any of the electromagnetic spectrum parameters of a piece of equipment, a letter stating these changes may be submitted via the chain of command to the appropriate SYSCOM SS/E^3 Office for submission to CNO (N6F13) and the Navy and Marine Corps Frequency Management Office (FMO) for processing. The subsequent processing and approval of this request for modification to an existing certification will result in a Note-To-Holders (NTH) being issued by the Military Communications Electronics Board (MCEB) to the requestor, and to all holders of the existing spectrum certification documentation. A "minor" change is defined as:

- Adding additional nomenclatures to the existing equipment
- Adding supportability comments that have been provided by the NTIA or a Host Nation
- Adding an additional location for use of the same equipment or system(s)
- Documenting minor modifications, or improvements to equipment that does NOT alter the approved operating characteristics and spectral response.
- Announcing the cancellation or reinstatement of a spectrum certification

The SYSCOM SS/E^3 offices, NETWARCOM, or CNO (N6F13) can provide additional guidance on whether a new DD 1494 should be

submitted, or a letter is required to modify an existing certification of spectrum support.

3. Instructions for completing the DD 1494 application are located on the reverse sides of the pages of the DD 1494 or assistance can be provided by the SYSCOM SS/E3 offices. Data submitted should be as complete as possible. For commercial, off-the-shelf procurement, include the specifications given by the manufacturer. Stage 1 and 2 submissions may contain estimated or calculated data. Stage 3 submissions should contain measured data, except where measured data is not available, then calculated data may be used. Stage 4 submissions require measured spectral data.

4. An E^3 assessment or determination of compatibility of the proposed equipment/system in its intended electromagnetic environment shall be conducted by the developing activity by addressing the requirements of reference (h). A copy of the findings shall accompany each submission. Activities originating DD 1494 applications are required to ensure that electromagnetic compatibility (EMC) is adequately considered for their equipment. The DD 1494 application shall include references to analysis, evaluations and/or tests (depending on the Stage of the submission) demonstrating that the proposed system has been reviewed and analyzed to ensure EMC in its intended operational environment.

5. If a deviation from an E^3 standard parameter is proposed, a request for waiver and justification (economic, technical, schedule) shall be included. When a departure from the National or International Tables of Frequency Allocations is proposed, additional justification supporting the proposed "out-of-band" operations shall be included. The technical justification must show that the proposed out-of-band operations will not degrade the EMC of the current environment. Requests for waiver of E^3 requirements which impact operational capability or national or international regulations or treaties shall be submitted with supporting analyses and/or test data to CNO (N6F) for consideration. OPNAV N6 shall coordinate any potential treaty impacts or compliance issues, as a result of departures from the National and International Tables of Allocations, with OPNAV N3/N5 as appropriate.

(NOTE: Normally, frequencies of operation for new equipment or systems are selected from bands allocated to the appropriate radio service or to similar systems. In certain cases, after due consideration for the protection of existing primary

services and of the possible operational restrictions to the new developed equipment, the developer may propose other frequency bands for operation. In such extraordinary circumstances, operational, technical, and economic justification must be provided with the application. Technical justification must demonstrate that the proposed system will not degrade the electromagnetic compatibility of the current environment. Proposed out-of-band systems will have secondary status and may only operate on a not-to-interfere basis (NIB) to established services. However, nothing in this instruction is intended to impede research toward the development of C-E systems that are necessary to increase the combat effectiveness of the NAVY.)

6. When equipment is proposed for use outside of the US&P, the developing activity shall take action, in coordination with the appropriate International Program Office (IPO), to obtain approval for release of DD 1494 data needed to coordinate the use of the equipment within the territories of the host nation(s). A statement authorizing disclosure of the DD 1494 equipment data should be provided on the DD 1494 (or on a separate letter) and should list which items are releasable to which countries. The DD 1494 has a separate page for data needed for foreign coordination if the equipment is to be used outside of the United States and Possessions (US&P). That page must be completed by the developing command before coordination can be initiated. In those cases when dealing with existing legacy equipment that no longer has an active program office or acquisition command, NETWARCOM and/or CNO (N6F13) is authorized to provide the necessary foreign releasability statements to coordinate the use of that equipment within the territories of the host nation(s).

7. Assistance in preparing and submitting the DD 1494 may be obtained from the respective SYSCOM SS/E^3 offices (NAVAIR, NAVSEA and SPAWAR) or NETWARCOM. Direct liaison is encouraged with CNO (N6F13) and NETWARCOM after initial contact with the appropriate SYSCOM SS and E^3 offices, which advise and assist CNO (N6F13) in the spectrum certification approval process and to select appropriate frequency bands. Direct liaison with CNO (N6F13) is encouraged to discuss system developments of a highly sensitive or unusual nature.

8. All Navy DD 1494 requests are coordinated among the military services prior to approval. The coordination is accomplished for CNO (N6F13) by NETWARCOM and the Navy-Marine Corps FMO through the Military Communications-Electronics Board (MCEB) via the Equipment Spectrum Guidance Permanent Working Group (ESG

PWG). Such coordination also provides data to the DOD Joint Spectrum Center (JSC). This data is available to NAVY activities upon formal request.

9. List of equipment and C-E devices requiring the submission of a DD 1494 (not necessarily all inclusive):

a. Communications equipment
b. Radars
c. Transmitters
d. Receivers
e. Electronic Warfare Systems, e. g., Counter IED jammers
f. Simulators
g. Equipment using civilian bands
h. Off-the-shelf systems
i. Equipment bought from foreign nations
j. New systems in a band already used for similar systems
k. Classified systems
l. Modified versions of previously approved equipment
m. Systems already used by the Army or Air Force
n. Systems not planned for operational use
o. Systems to be used at sea only
p. Existing systems without spectrum certification
q. Leased equipment
r. Test equipment
s. Low Power (NTIA Manual Annex K equipment) that will be used overseas or outside the United States and Possessions (US&P)

Frequency Assignments

1. Frequency assignments are authorized for use during material development stages (Stage 2 and 3) in an interactive process, since assignments for use during Stages Two and Three are for a limited time and area and are on a non-interference basis. Any change to the operational system (Stage 4) which alters its electromagnetic radiation or locations requires a modified frequency assignment.

2. Commands, bases, ranges, and laboratories within the US&P shall submit frequency requirements and requests in accordance with approved MCEB standards and procedures (currently reference (f)) to the Navy and Marine Corps regional spectrum management offices who will then forward frequency assignment requests to higher authorities for approval as required.

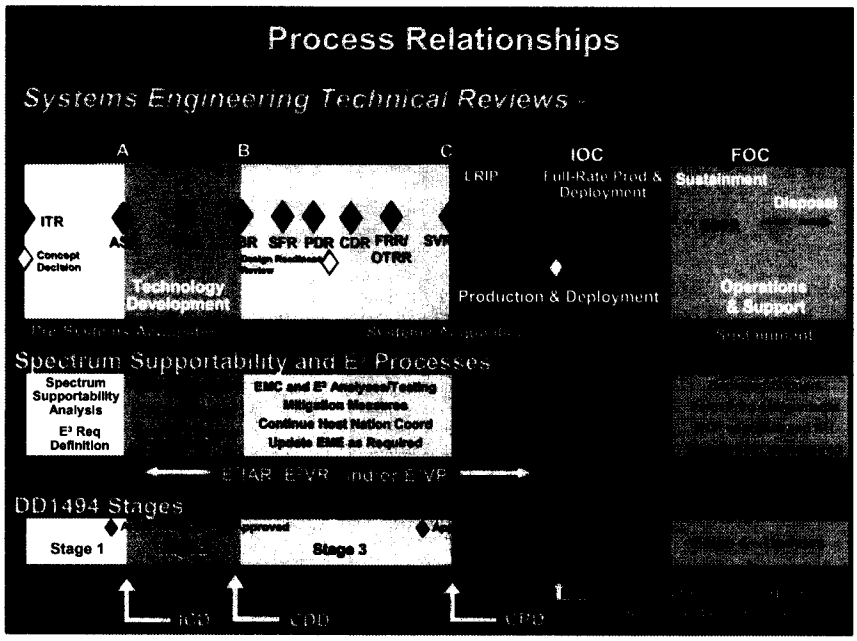
3. Frequency assignment authorizations for electronic warfare (EW) and electronic countermeasure (ECM) operations in the

United States and Canada are established for U.S. military units on a standing basis for selected bands. They are used for each individual operation only after special coordination. Authority, restrictions, and detailed coordination procedures, for use of radio frequency bands for ECM operations, are contained in reference (aa).

4. Combatant commanders authorize use of frequencies assigned in their geographical areas, including US&P, per reference (e). NAVY use of frequencies within a combatant command area of cognizance is coordinated through Fleet Combatant Commanders, the NETWARCOM Navy and Marine Corps regional spectrum offices, or their designated representatives, and the COCOM Joint Frequency Management Offices (JFMOs). Navy coordination of combatant command assignments is through the Joint Frequency Panel (JFP) of the MCEB.

Process Relationships

1. Figure 3 shows the relationships between the DOD 5000 acquisition process, the CJCSI 3170 requirements process, and the Spectrum Supportability Determination process.



ITR - Initial Technical Review
ASR - Alternative System Review
SRR - System Requirements Review
IBR - Integrated Baseline Review
SFR - System Functional Review
PDR - Preliminary Design Review
CDR - Critical Design Review
TRR - Test Readiness Review
FRR - Flight Readiness Review
FRP - Full Rate Production
OTRR - Operational Test Readiness Review
SVR - System Verification Review
PRR - Production Readiness Review
PCR - Physical Configuration Review

ECP - Engineering Change Proposal
ECPR - Engineering Change Proposal Review
E3IAR - Electromagnetic Environmental Effects (E3) Integration and Analysis Report
E3VP - E3 Verification Procedures
E3VR - E3 Verification Report
E3 - Electromagnetic Environmental Effects
EME - Electromagnetic Environment
P³I - Pre-Planned Product Improvement

ICD - Initial Capabilities Document
CDD - Capability Description Document
CPD - Capability Production Document

IOC - Initial Operating Capability
FOC - Full Operational Capability

Figure 3
Process Relationships

Recommended Spectrum Supportability (SS) and Electromagnetic Environmental Effects (E^3) Verbiage for Acquisition documents

INITIAL CAPABILITIES DOCUMENT (ICD) - Acquisition Milestone Supported: Pre-MS A and MS A

It is suggested that the following verbiage, tailored as required for program specifics, be included in the noted ICD sections:

Within Paragraph 3, Concept of Operations Summary OR Paragraph 4, Capability Gap, of the ICD, provide primary statements regarding the requirement for Spectrum Supportability and electromagnetic compatibility:

"The XXXX capability shall comply with applicable DoD, Navy, Joint, National, and International spectrum management policies and regulations.

Operational performance shall not be degraded by electromagnetic environmental effects (E^3) effects.

Safety shall not be compromised by Hazards of Electromagnetic Radiation to Ordnance (HERO) or to Fuel (HERF) or to Personnel (HERP), or EMI or ESD."

Within Paragraph 5, Threat/Operational Environment, provide a supporting statement such as:

"Systems and equipment developed and procured to achieve this capability must be electromagnetically self-compatible and compatible with all other systems and equipment operating in the intended operational electromagnetic environment (EME), both natural and man-made."

CAPABILITY DEVELOPMENT DOCUMENT (CDD) - Acquisition Milestone Supported: MS B
Required by: CJCSI/CJCSM 3170.01/6212.01

It is suggested that the following verbiage, tailored as required for program specifics, be included in the noted CDD sections:

CDD Section 4, Threat Summary

"The equipment/subsystem/system/platform shall not be degraded by electromagnetic environmental effects and with other systems and platforms, including allied and coalition systems, from use in the operational electromagnetic environment, both natural and man-made. The minimum RF electromagnetic environments are defined in MIL-STD-464A and may be tailored to define the RF EME as required by the operational lifecycle profile of the system/platform."

CDD Section 10, Electromagnetic Environmental Effects and Spectrum Supportability

"The XXX system (or equipment) shall be mutually compatible and operate compatibly in the electromagnetic environment. It shall not be operationally degraded or fail due to exposure to electromagnetic environmental effects, including high intensity radio frequency (HIRF) transmissions or high-altitude electromagnetic pulse (HEMP). Ordnance systems will be integrated into the platform to preclude unintentional detonation. Platform/system/subsystem EMC performance requirements are specified in MIL-STD-464A (platform level) and MIL-STD-461E (equipment and subsystem/system level) for all electromagnetic disciplines. (THRESHOLD)"

"Ships and shipboard systems shall be required to comply with DON requirements for Topside Design and Ship EMC Certification in accordance with NAVSEA S9040-AA-GTP-00/SSCR Rev 4, change 1, Shipboard Systems Certification Requirements for Surface Ship Industrial Periods (Non-Nuclear) prior to operational use."

"Equipment Spectrum Certification. The XXX equipment will comply with the applicable DoD, Navy, National, and International spectrum management policies and regulations and will obtain spectrum certification prior to operational deployment. DD Form 1494 will be submitted to the Military Communications Electronics Board Joint Frequency Panel. (THRESHOLD)"

CDD Section 14, Other System Attributes, as applicable

- "Hazards of Electromagnetic Radiation to Ordnance (HERO). All ordnance items shall be integrated into the system in such a manner as to preclude all safety problems and performance degradation when exposed to its operational EME. (THRESHOLD)"

- "Hazards of Electromagnetic Radiation to Personnel (HERP). All Radio Frequency (RF) Electromagnetic (EM) emitters shall be integrated into the ship system in such a manner as to preclude all HERP safety issues. (THRESHOLD)"

- "Hazards of Electromagnetic Radiation to Fuel (HERF). All Radio Frequency (RF) Electromagnetic (EM) emitters shall be integrated into the ship system in such a manner as to preclude all HERF safety issues. (THRESHOLD)"

CAPABILITY PRODUCTION DOCUMENT (CPD) - Acquisition Milestone Supported: MS C

Required by: CJCSI/CJCSM 3170.01/6212.01

It is suggested that the following verbiage, tailored as required for program specifics, be included in the noted CDD sections:

CPD Section 4, Threat Summary

"The equipment/subsystem/system/platform shall not be degraded by electromagnetic environmental effects and with other systems and platforms, including allied and coalition systems, from use in the operational electromagnetic environment, both natural and man-made. The minimum RF electromagnetic environments are defined in MIL-STD-464A and may be tailored to define the RF EME as required by the operational lifecycle profile of the system/platform."

CPD Section 10, Electromagnetic Environmental Effects and Spectrum Supportability

"The XXX system (or equipment) shall be mutually compatible and operate compatibly in the

electromagnetic environment. It shall not be operationally degraded or fail due to exposure to electromagnetic environmental effects, including high intensity radio frequency (HIRF) transmissions or high-altitude electromagnetic pulse (HEMP). Ordnance systems will be integrated into the platform to preclude unintentional detonation. Platform/system/subsystem EMC performance requirements are specified in MIL-STD-464A (platform level) and MIL-STD-461E (equipment and subsystem/system level) for all electromagnetic disciplines. (THRESHOLD)"

"Ships and Systems shall be compliant with existing DON requirements for Topside Design and Ship EMC Certification in accordance with NAVSEA S9040-AA-GTP-00/SSCR Rev 4, change 1, Shipboard Systems Certification Requirements for Surface Ship Industrial Periods (Non-Nuclear)."

"Equipment Spectrum Certification. The XXX equipment will comply with the applicable DoD, Navy, National, and International spectrum management policies and regulations and will obtain spectrum certification prior to permanent installment. DD Form 1494 will be submitted to the Navy Marine Spectrum Center to obtain spectrum certification. A releasing letter will be drafted by the Program Office and forwarded to NMSC to initiate Host Nation Authorization coordination."

<u>CPD Section 14, Other System Attributes, as applicable</u>

- "Hazards of Electromagnetic Radiation to Ordnance. All ordnance items shall be integrated into the system in such a manner as to preclude all safety problems and performance degradation when exposed to its operational EME. (THRESHOLD)"

- "Hazards of Electromagnetic Radiation to Personnel (HERP). All Radio Frequency (RF) Electromagnetic (EM) emitters shall be integrated into the ship system in such a manner as to preclude all HERP safety issues. (THRESHOLD)"

- "Hazards of Electromagnetic Radiation to Fuel (HERF). All Radio Frequency (RF) Electromagnetic (EM) emitters shall be integrated into the ship system in such a manner as to preclude all HERF safety issues. (THRESHOLD)"

Electromagnetic Environmental Effects/Spectrum Supportability Compliance Action List (CAL 3.0)

Domain Owner: Mr. Dave D. Harris, OPNAV N6F13
Domain Executive Agent: Mr. David "Mark" Johnson, NAVSEA (SEA05W43)
OPNAV POC: Mr. Dave D. Harris (dave.harris@Navy.mil, (703) 601-3968)
TA POC: Mr. David "Mark" Johnson (david.m.johnson4@Navy.mil; (202) 781-3140)

3.0 **Electromagnetic Environmental Effects/Spectrum Supportability**
Overview: The focus of the Electromagnetic Environmental Effects (E3) and Spectrum Supportability (SS) Compliance Action List is to ensure systems have met FORCEnet policy requirements for E3/Spectrum Supportability. FORCEnet policies require systems to have well-defined, E3 control performance and verification parameters, a spectrum supportability plan, as well as applications for the proper equipment frequency allocation.

3.1 Development of a spectrum dependent system shall have an established Spectrum Supportability and Electromagnetic Environmental Effects Working Level Integrated Process Team.

3.1.1 Does the program have an established Spectrum Supportability and E3/SS Working Level Integrated Process Team?

3.2 Development of a spectrum dependent system shall have established E3 performance and verification requirements.

3.2.1 Does the program have an established set of E3 performance and verification requirements?

3.3 Development of a spectrum dependent system shall result in the definition of the intended operational Electromagnetic Environment.

3.3.1 Does the system have a defined, intended operational Electromagnetic Environment?

3.4 Development of a spectrum dependent system shall result in the definition of the Test & Evaluation strategy for a system and a platform, which addresses Electromagnetic Compatibility/Electromagnetic Vulnerability.

3.4.1 Does the program have a Test & Evaluation strategy, which addresses Electromagnetic Compatibility/Electromagnetic Vulnerability?

3.5 Development of frequency dependent systems shall include the submission and approval of a DD Form 1494 (Application for Equipment Frequency Allocation). In addition, no spectrum dependent system shall proceed to the System Development and Demonstration Phase without a Spectrum Supportability determination unless granted a waiver by the Milestone Decision Authority.

3.5.1 Does the program have an approved DD Form 1494?

3.5.1.1 If the program has an approved DD Form 1494, provide the JF-12 number.

3.5.1.2 Has the system completed and submitted an initial Stage 1 (Conceptual) DD Form 1494

for coordination prior to Milestone A?

3.5.1.3 Has the system completed and submitted a Stage 2 (Experimental) DD Form 1494 for coordination prior to Milestone B (or before contract award)?

3.5.2 Has the program proceeded to the System Development and Demonstration Phase?

3.5.2.1 Does the system have a Spectrum Supportability determination or has it been granted a waiver to proceed by the Milestone Decision Authority?

3.5.2.2 Has the system completed and submitted a Stage 3 (Developmental) DD Form 1494 for coordination, prior to Milestone C?

3.6 No spectrum dependent system shall proceed into the Production and Deployment Phase without a Spectrum Supportability determination unless granted a waiver by USD (AT&L) or ASD (NII).

3.6.1 Has the program proceeded into the Production and Deployment Phase?

3.6.1.1 Does the system have a Spectrum Supportability determination granted by the MCEB (or ASD NII or USD AT&L) or a waiver granted by ASD (NII) to proceed?

3.6.1.1.1 What is the date the Spectrum Supportability Plan was approved?

3.6.1.1.2 What is the date the waiver was granted by ASD (NII)?

3.6.1.2 Has the system completed and submitted a Stage 4 (Operational) DD Form 1494 for coordination, after Milestone C?

3.7 No spectrum dependent "off the shelf" or other non-developmental system shall be procured without a Spectrum Supportability Determination.

3.7.1 Does the system utilize "off the shelf" or other non-developmental parts?

3.7.1.1 Was a Spectrum Supportability Determination received prior to procurement?

3.8 Spectrum Supportability Determination: The assessment as to whether the electromagnetic spectrum necessary to support the operation of a spectrum-dependent equipment or system during its expected life cycle is, or will be, available (that is, from system development, through developmental and operational testing, to actual operation in the electromagnetic environment).

The assessment of "Spectrum Supportability" requires, at a minimum:

- Receipt of equipment spectrum certification,
- Reasonable assurance of the availability of sufficient frequencies for operation from Host Nations, and
- Consideration of EMC.

3.8.1 Does the System meet the requirements of Spectrum

Supportability by having an equipment spectrum certification?

3.8.2 Does the System meet the requirements of Spectrum Supportability by providing reasonable assurance of the availability of sufficient frequencies for operation from Host Nations?

3.8.3 Does the System meet the requirements of Spectrum Supportability by considering by ensuring Electromagnetic Compatibility (EMC) with other installed systems and equipments?

3.9 Program/System Documentation: Program/system documentation addresses E3 and SS requirements and compliance criteria.

3.9.1 Does the System have an Initial Capabilities Document (ICD)?

3.9.1.1 Does the System ICD address E3 and SS requirements and compliance criteria?

3.9.2 Does the System have a Capability Development Document (CDD)?

3.9.2.1 Does the System CDD address E3 and SS requirements and compliance criteria?

3.9.3 Does the System have a Capability Production Document (CPD)?

3.9.3.1 Does the System CPD address E3 and SS requirements and compliance criteria?

3.9.4 Does the System have a Test and Evaluation Master Plan (TEMP)?

3.9.4.1 Does the System TEMP address E3 and SS requirements and compliance criteria?

3.10 Hazards of Electromagnetic Radiation to Ordinance: A Hazards of Electromagnetic Radiation to Ordinance (HERO) Assessment and/or Survey is funded.

3.10.1 Does the System have a Hazards of Electromagnetic Radiation to Ordnance (HERO) Assessment and/or Survey funded?

3.11 Hazards of Electromagnetic Radiation to Personnel and Fuels: A Hazards of Electromagnetic Radiation to Personnel and Fuels (HERP/HERF) Assessment and/or Survey is funded.

3.11.1 Does the System have a Hazards of Electromagnetic Radiation to Personnel and Fuels (HERP/HERF) Survey funded?

3.12 System Electromagnetic Compatibility Certification: A System Electromagnetic Compatibility (EMC) Certification Survey funded.

3.12.1 Does the System have a System Electromagnetic Compatibility (EMC) Certification Survey funded?

3.13 Other E3/Spectrum Supportability Analysis: Other requisite E3/SS Analysis is funded as appropriate to include: Electromagnetic Emission Control (EMCON), Emissions Security (EMSEC) (compromising emanations, formerly called TEMPEST), Electromagnetic Pulse (EMP),

Lightning Protection, Precipitation Static (P-Static), and / or Electrostatic Discharge (ESD).

3.13.1 Does the System have an Electromagnetic Emission Control (EMCON) analysis/survey funded?

3.13.2 Does the System have an Emissions Security (EMSEC) (compromising emanations, formerly called TEMPEST) analysis/survey funded?

3.13.3 Does the System have an Electromagnetic Pulse (EMP) analysis/survey funded?

3.13.4 Does the System have a Lightning Protection analysis/survey funded?

3.13.5 Does the System have a Precipitation Static (P-Static) analysis/survey funded?

3.13.6 Does the System have an Electrostatic Discharge (ESD) analysis/survey funded?

3.14 Commercial Item /Non-Developmental Item Determination: Determination made regarding feasibility and impact of Commercial Item (CI)/Non-Developmental Item (NDI).

3.14.1 Does the system utilize Commercial Item (CI) and/or Non-Developmental Item (NDI) sub-components?

3.14.1.1 Has a determination been made regarding the E3 and Spectrum Supportability impacts of using Commercial Items (CI) and/or Non-Developmental Items (NDI)?

3.15 Integrated Topside Design Analysis: Integrated Topside Design analysis funded on all intended platforms.

3.15.1 Does the System have an Integrated Topside Design analysis (which includes placement) funded on all intended platforms?

3.16 Shore Site E3/Spectrum Supportability: Shore site E3/SS analysis is funded and performed in support of new equipment/system installations at all shore sites. Shore site E3/SS analysis includes: Ashore Electromagnetic Environmental Effects Analysis and Certification, Ashore HERP/HERF/HERO Certification, and Ashore Spectrum Supportability Analysis and Certification.

3.16.1 Does the program have plans to install the system at any ashore location?

3.16.1.1 Does the System have an Ashore Spectrum Supportability Analysis and Certification survey funded?

3.16.1.2 Does the System have an Ashore HERP/HERF/HERO Certification Survey funded?

3.16.1.3 Does the System have an Ashore Electromagnetic Environmental Effects Analysis and Certification Survey funded?

Procedures for Implementation of the National Emergency Readiness Plan (ERP) for the Use of the Radio Spectrum

1. General Information

a. The NTIA ERP is prepared, maintained and updated by the Emergency Planning Subcommittee (EPS) of the Interdepartment Radio Advisory Committee (IRAC) of the National Telecommunications and Information Administration (NTIA) in collaboration with the Federal Communications Commission (FCC) liaison representative to the IRAC.

b. The current edition of the ERP is dated April 2003 and was developed by NTIA pursuant to Executive Order 12472 dated April 3, 1984. Part IV of this plan documents responsibilities of the Federal Government agencies in maintaining essential spectrum management functions during a natural or man-made disaster.

2. Specific Responsibilities

a. NETWARCOM

(1) Ensure all Navy and Marine Corps systems and assignments are reviewed and appropriately documented in the applicable records as determined by the NTIA IRAC EPS.

(2) Ensure all Navy and Marine Corps equipment and systems certifications, and associated US&P frequency assignments are annotated with emergency priority of use information as necessary.

(3) Represent Navy and Marine Corps interests at all EPS meetings and conferences.

(4) Develop, maintain, update and periodically test (at least semiannually) Continuity of Operations Plans (COOP) to provide for effective emergency relocation and continued operation of essential Navy and Marine Corps National and regional level spectrum management operations.

(5) Provide Navy and Marine Corps FMO participation in all Federal Government emergency relocation tests when requested by NTIA.