



DoD INSTRUCTION 4630.09

COMMUNICATIONS WAVEFORM MANAGEMENT AND STANDARDIZATION

Originating Component:	Office of the DoD Chief Information Officer
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Approved by:	Dana Deasy, DoD Chief Information Officer

Purpose: In accordance with the authority provided the DoD Chief Information Officer (CIO) in DoD Directive (DoDD) 5144.02, this issuance establishes policy, assigns responsibilities, and provides procedures for:

- Periodically reviewing waveforms as they mature to evaluate the capabilities' interoperability, security, reusability, exportability, and operational value for DoD use.
- Fostering innovation by creating a process that allows waveform developers, in coordination with a Lead Military Service or Sponsor, to submit conceptual waveforms for analysis and recommendations before either the developer or DoD make significant investments in duplicative capabilities.

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SECTION 1: GENERAL ISSUANCE INFORMATION

1.1. APPLICABILITY.

This issuance:

a. Applies to:

(1) OSD, the Military Departments, the Office of the Chairman of the Joint Chiefs of Staff (CJCS) and the Joint Staff, the Combatant Commands, the Office of Inspector General of the Department of Defense, the Defense Agencies, the DoD Field Activities, and all other organizational entities within the DoD (referred to collectively in this issuance as the “DoD Components”).

(2) All information technology (IT) and national security systems communication waveforms acquired, procured (systems or services), or operated by any DoD Component, to include wireless communication products and associated technology, processes, personnel, programs, and organizations that initiate, develop, test, and use waveforms.

(3) Foreign disclosure and technology security processes in accordance with DoDD 5230.11 and DoD Instruction (DoDI) 2040.02.

b. Does not apply to:

(1) Programs and procurements that use standards-based commercial communication services or commercial off-the-shelf (COTS) waveforms that have not been modified for use by DoD. COTS equipment is subject to the policy in the January 19, 2017 Memorandum of Agreement between DoD and the Department of Homeland Security.

(2) Science and technology efforts for research purposes and the pre-system acquisition phase. However, this instruction does apply to those waveform technology demonstration efforts serving as a precursor to either system fielding or transition to a formal Program of Record (PoR).

c. Will not alter or supersede the existing authorities and policies of the Director of National Intelligence regarding the protection of sensitive compartmented information and special access programs for intelligence as directed by Executive Order 12333 and other laws and regulations. Application of the provisions and procedures of this issuance to sensitive compartmented information or other special access programs for intelligence information systems is encouraged, where these provisions and procedures may complement or discuss areas not otherwise specifically addressed.

1.2. POLICY.

a. The DoD’s annual inventory of DoD communication waveforms is the authoritative source for DoD waveforms.

(1) Waveforms are categorized as either Core or Non-core. Core waveforms are those waveforms that are essential to conducting command and control in multi-domain, joint, or combined environments. Non-core waveforms are typically operated by a single Service for a specific purpose within a Service-unique environment.

(2) The Command, Control, and Communications Leadership Board (C3LB) will categorize waveforms. Core waveforms require either a Lead Service or Sponsor level of stewardship. Non-core waveforms require a Sponsor level of stewardship. Roles, responsibilities, and assignment processes for Lead Service and Sponsor-level stewardship of Core and Non-core waveforms are defined in Section 2.

b. The DoD Information Repository (DoD IR), maintained by the Joint Tactical Networking Center (JTNC), is the authoritative storage repository for DoD waveforms and associated communication products, excluding hardware.

c. Before procurement of a COTS or non-development item (NDI) waveform, due consideration should be given to using or enhancing existing waveforms by consulting the DoD IR and the joint communication marketplace to determine if an existing waveform can fulfill the requirement.

d. Waveforms will be analyzed to ensure that they meet interoperability, security, reusability, and exportability standards and provide operational value. Analysis will consider technology that supports waveforms, such as radios and network managers, in accordance with the procedures specified in this instruction.

e. Pursuant to DoDI 5000.02, all waveforms will enter a review process and be considered for analysis when a Lead Service or Sponsor submits a waveform analysis application (WAA) to the DoD CIO via the JTNC at: https://www.dodir.mil/waveform_submission. This includes:

- (1) Development of new, modified, or enhanced waveforms; and
- (2) Use of independently developed waveforms.

f. Waveforms will provide interoperability with IT and national security systems in compliance with DoDI 8330.01.

SECTION 2: RESPONSIBILITIES

2.1. DOD CIO.

The DoD CIO:

- a. Oversees implementation of this issuance and serves as the disposition authority for DoD waveforms and standardization.
- b. Coordinates with the Under Secretary of Defense for Acquisition and Sustainment (USD(A&S)) and other acquisition authorities in the enforcement of the standards, policies, and procedures provided in this issuance. The DoD CIO provides waveform analysis reports and recommendations to the USD(A&S), the Lead Service and Sponsors, and waveform developers.
- c. In coordination with the USD(A&S) and the Director of JTNC, ensures information on all DoD waveforms is present and accessible in the DoD IR.
- d. Verifies that the applicable waveforms in the DoD IR are referenced in the DoD Information Technology Standards Registry (DISR).
- e. Annually issues the DoD Communications Waveform Inventory. The inventory will be reviewed by the C3LB, which will make recommendations to the Deputy Secretary of Defense for the assignment of Lead Service responsibilities.
- f. Reviews each new, modified, or enhanced waveform with technical support and procedures in accordance with Section 3.
- g. Reviews the DoD IR as necessary to identify those waveforms that have served their intended purpose for use in military operations and are now obsolete.
- h. Determines the appropriate Waveform Analysis Process Stages, as defined in Section 3, for waveforms based on their maturity and issues disposition memoranda.
- i. In coordination with the Director, National Security Agency/Chief, Central Security Service (DIRNSA/CHCSS), the CJCS, and the Secretaries of the Military Departments, develops and maintains a tactical communications modernization plan.
- j. Ensures waveform dispositions are added to Information Support Plan documentation.
- k. Provides guidance to, and consults with, the Secretary of Defense, USD(A&S), Secretaries of the Military Departments, Director of Operational Test and Evaluation (DOT&E), and Director of JTNC with respect to:
 - (1) General and specific waveform testing and evaluation in DoD.
 - (2) Monitoring and reviewing of waveform testing activities.

l. Reviews JTNC recommendations for the exportability of tactical communication products. In coordination with the USD(A&S), reviews WAAs to determine analysis requirements and provides disposition on waveform development or modification for programs.

m. In coordination with the DIRNSA/CHCSS, assesses waveforms for inherent vulnerabilities to adversary cyber or intelligence collection operations and mitigates as appropriate.

2.2. DIRECTOR, DEFENSE INFORMATION SYSTEMS AGENCY (DISA)

Under the authority, direction, and control of the DoD CIO and in addition to the responsibilities in Paragraph 2.7., the Director, DISA:

a. Provides subject matter expertise to the DoD CIO for the review process of individual communication waveforms.

b. Supports the DoD CIO in ensuring that waveform standards are referenced in the DISR in compliance with this instruction.

c. Provides the DoD CIO with certificates and reports from the Joint Interoperability Test Command and any other relevant waveform analysis activities.

d. Conducts additional waveform testing when necessary using available DoD test facilities. If needed, uses unique test capabilities beyond what are already available within DoD or commercially (e.g., Federally Funded Research and Development Centers, academia).

2.3. USD(A&S).

The USD(A&S):

a. As the Defense Acquisition Executive and with the support of the DoD CIO and the Director of JTNC, enforces the policies and procedures of this instruction during systems acquisitions.

b. Ensures programs reuse existing waveforms from the DoD IR before adopting or developing new waveforms. Provides oversight to confirm that programs that develop or adopt new waveforms follow processes in accordance with this issuance, giving priority to rapid acquisitions to allow employment in a timely manner.

c. In coordination with the DoD CIO, reviews WAAs to determine analysis requirements and provide disposition on waveform development or modification for programs.

2.4. DOT&E.

The DOT&E ensures that adequate plans are available to test and analyze waveform operational performance when waveforms are used in programs under DOT&E oversight.

2.5. UNDER SECRETARY OF DEFENSE FOR INTELLIGENCE AND SECURITY (USD(I&S)).

The USD(I&S) serves as the DoD focal point to the intelligence community for waveform policy and oversight matters relating to intelligence information sharing and interoperability of DoD intelligence systems and processes in accordance with DoDD 5143.01.

2.6. DIRNSA/CHCSS.

Under the authority, direction, and control of the USD(I&S), consistent with Section 142 of Title 10, United States Code, and in addition to the responsibilities in Paragraph 2.7., the DIRNSA/CHCSS:

- a. Leads, with the support of the Lead Services and Sponsors, the development of suitable technical standards; administrative guidance; key-management protocols, devices, and systems; encryption methods; and other items as required to enable waveforms to comply with applicable security controls.
- b. Prescribes the standards, methods, and procedures for secure operation, management, and protection of waveforms.
- c. Coordinates with the DoD CIO to develop and maintain the DoD CIO tactical communications modernization plan.
- d. Coordinates with the JTNC on security standards, compliance, and certification regarding software-defined radios and waveforms, including those applicable to export.
- e. Provides the DoD CIO with National Security Agency certifications as needed for waveform analysis.

2.7. DOD COMPONENT HEADS.

The DoD Component heads, as assigned, plan and budget for Lead Service and Sponsor responsibilities necessary to comply with this issuance:

- a. The waveform Lead Service is responsible for establishing and maintaining a joint enterprise-level view of assigned waveforms or systems; maintaining and monitoring compliance with associated Joint or Service standards; and providing enterprise-level engineering analysis and recommendations to the Military Services and the DoD CIO as the Principal Staff Assistant (PSA). The waveform Lead Service will:

- (1) Conduct joint enterprise-level system engineering and analysis activities, including analysis to understand and characterize the impacts and potential tradeoffs for solutions or approaches that vary from the PoR (e.g., NDIs, small form-factor terminals, etc.).

(2) Compile joint fielding and terminal development strategies and recommend associated priorities.

(3) Develop, update, and monitor compliance of PoR and NDI systems with Reference Implementations, message sets, specifications, and classifications guidance.

(4) Establish and update policy for minimum implementations and common interfaces, using the Reference Implementation or Implementation as a basis.

(5) Collect cost and schedule data on Service modernization and fielding plans, and maintain a history of such data.

(6) Document prioritized joint mission threads/kill chains and associated information exchange requirements.

(7) Maintain network management, design, and testing tools, their associated infrastructure, and human expertise.

(8) Resolve cross-Service disconnects and elevate such matters to the PSA when resolution is not possible.

(9) Serve as the technical advisor for foreign military sales (FMS), direct commercial sales (DCS), export controls, and communications security in accordance with DoDD 5230.11, DoDI 2040.02, and DoDI 8330.01.

(10) In conjunction with the PSA, make policy recommendations and develop roadmaps to support the development and maturity of the waveform and associated applications.

(11) Coordinate with the PSA, USD(A&S), and Under Secretary of Defense for Research and Engineering to advocate for waveform and terminal development with the Service budget process.

(12) Coordinate with the PSA, USD(A&S), and Under Secretary of Defense for Research and Engineering to ensure appropriate technology protection requirements and processes are in place to advance waveform and terminal development with the Military Services.

b. The waveform Sponsor is responsible for establishing and maintaining an enterprise-level view of assigned waveforms or systems, maintaining and monitoring compliance with associated military standards, and providing enterprise-level engineering analysis and recommendations to the other Military Services and the PSA. In this capacity, the waveform Sponsor will:

(1) Conduct engineering and analysis activities, including integration into the Joint Information Environment framework.

(2) Perform analyses to understand and characterize the impacts and potential tradeoffs for solutions or approaches that vary from the PoR (e.g., NDI, small form-factor terminals).

(3) Develop, update, and monitor compliance of PoR and NDI systems with a reference implementation, message sets, specifications, and classification guidance.

(4) Establish and update policy for waveform implementations and common interfaces, using a reference implementation.

(5) Maintain network management, design, testing tools, and associated infrastructure for waveform management.

(6) Serve as the technical advisor for FMS, DCS, export controls, and communications security.

(7) Notify the C3LB of waveform modifications or enhancements that impact command and control interoperability.

(8) Ensure compliance with this issuance throughout the systems acquisition process as communication waveforms are developed, modified, or enhanced.

(9) Encourage vendors, and ensure that the U.S. Government sponsor/Program Office coordinates with the JTNC when modifying registered DoD waveforms or developing new concepts, to align efforts with needed DoD capabilities.

(10) Provide subject matter expertise to the DoD CIO in the analysis process of individual communication waveforms.

(11) Ensure updates to the waveforms and wireless communication software products and standards are submitted to the JTNC in accordance with procedures in the JTNC waveform submission process at: https://www.dodir.mil/waveform_submission.

(12) Notify the DoD CIO of the planned development of new, modified, or enhanced waveforms or the use of independently developed waveforms.

2.8. SECRETARY OF THE ARMY.

In addition to the responsibilities in Paragraph 2.7, the Secretary of the Army, through the Director of JTNC:

a. Performs independent technical tests and analyses as identified in this issuance and maintains the capability to conduct these waveform analyses.

b. Coordinates with the DoD CIO, USD(A&S), DOT&E, waveform developers, and Sponsors to schedule tests, develop procedures for test events, and provide cost information to enable developers and Sponsors to plan and budget for these test activities.

c. Tests and certifies waveforms to ensure compliance with DoD radio architecture standards and Application Programming Interface Standards. Provides certification reports to the DoD CIO.

- d. Provides subject matter expertise to the DoD CIO for the analysis of communication waveforms and wireless communication software products.
- e. Establishes and maintains a comprehensive cyber-hardened, controlled-access, DoD-wide IR on both the Secure Internet Protocol Router and Non-secure Internet Protocol Router networks that centralizes software code, documentation, and artifacts of DoD waveforms to enable authorized users to access content of the DoD IR and contribute to it.
- f. Establishes and maintains a DoD IR catalog of waveform users, noting specific waveform versions, radios, and platforms. This catalog will be used to aid DoD CIO waveform reviews and to assist in radio frequency spectrum allocation.
- g. Implements authentication and access controls for information in the DoD IR based on intellectual property (IP) rights markings (including restrictive notices or legends) governing the waveform information (e.g., software, technical data, and supporting materials). These controls will ensure that users are notified that IR information is provided only to users that are authorized to access and use that information in accordance with applicable IP rights and restrictions.
- h. Implements procedures to ensure that users accessing or reproducing waveform information in the DoD IR are subject to appropriate use and confidentiality obligations (e.g., a restricted-use and nondisclosure agreement) in accordance with the IP rights governing the information.
- i. Maintains a secure continuity of operations site. Maintains updated disaster recovery plans and ensures that authorized users are aware of procedures.
- j. In coordination with the DoD CIO and USD(A&S), develops, reviews, and maintains an implementation guide that provides guidance to the Lead Services and Sponsors, further explains the waveform analysis and disposition process, and provides information on how to access and use the IR.
- k. In coordination with the DIRNSA/CHCSS, supports the Lead Service and Sponsor in incorporating updates to the waveform and wireless communication standards.
- l. Supports the Lead Service and Sponsor by submitting applicable waveform standards to the DISR.
- m. Supports the Lead Service and Sponsor by providing guidance on the integration of waveform and wireless communications into the Joint Information Environment framework.
- n. Supports the Lead Service and Sponsor by providing guidance on waveform and wireless communication architectures, utilizing the WAA.
- o. Supports the DoD CIO, Lead Service, and Sponsor by providing exportability analyses of waveforms.

p. Analyzes Program Management Office Milestone B (MS B), Milestone C (MS C), and post MS C WAA submissions for evidence of waveform interoperability, security, reusability, exportability, and operational value and provides recommendations to the DoD CIO.

q. Develops a Waveform Abstract containing minimal essential information required by DoD to manage each waveform captured in the DoD Communications Waveform Inventory.

r. Maintains a Waveform Abstract in the DoD IR for all waveforms listed in the DoD Communications Waveform Inventory.

2.9. CJCS.

In addition to the responsibilities in Paragraph 2.7, the CJCS:

a. Validates requirements for new or modified waveforms in accordance with CJCS Instruction 5123.01H.

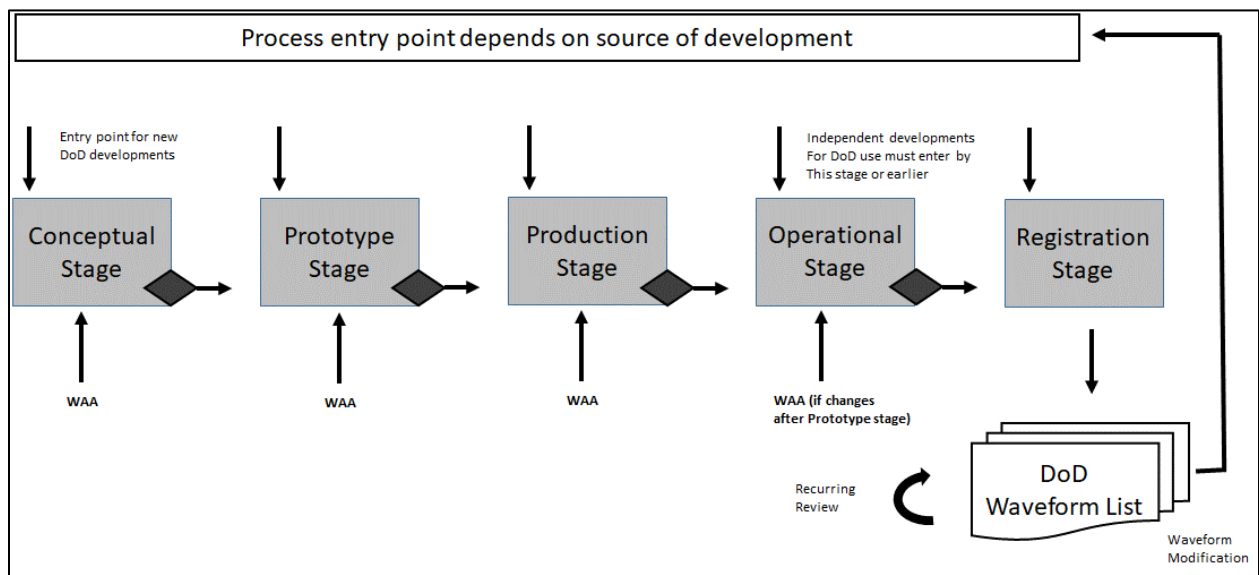
b. Develops joint and mission-partner tactical networking concepts of employment for contested environments that will inform joint tactical networking roadmaps and requirements.

SECTION 3: PROCEDURES

3.1. WAVEFORM ANALYSIS PROCESS OVERVIEW

a. The waveform analysis process provides a framework for evaluating a waveform at five distinct stages during its development. The process stages at Figure 1 allows the Lead Service or Sponsor to develop new, or to enhance old, waveforms and gain a DoD-wide position on their waveform before making significant resource commitments. The analysis process provides for periodic evaluations to ensure that the waveform is properly matured, tested, documented, and ultimately registered as a DoD waveform.

Figure 1. Waveform Analysis Process Stages



b. Developments and processes for waveform analysis are completed in accordance with the following:

- (1) Requirements, in accordance with Section 142 of Title 10, U.S. Code.
- (2) Tactical data link standardization, in accordance with CJCS Instruction 5123.01H.
- (3) Acquisition, in accordance with DoDI 5000.02.
- (4) Interoperability, in accordance with DoDI 8330.01.

c. Pursuant to DoDI 5000.02, programs that have a new, modified, or enhanced waveform will submit a WAA to the DoD CIO through the JTNC at MS B, and at MS C if a waveform is added or modified after MS B.

d. The waveform analysis process requires a waveform development effort to have a DoD Lead Service or Sponsor identified before the commitment of DoD funding resources. Waveforms require a Lead Service or Sponsor, at a minimum, before the production stage of this

process, which is when any fielding or operational usage occurs. As a waveform matures, the Lead Service or Sponsor may change. When this occurs, the requirements specified in this instruction transfer to the new Lead Service or Sponsor.

e. For non-software-defined radio waveforms, the Office of the DoD CIO will work with the Lead Service or Sponsor to determine whether additional effort or information is needed to complete the waveform analysis process. This determination will also place the waveform into the appropriate stage of the review process.

f. The procedures to analyze DoD waveforms are based on the DoD IR entrance criteria available at https://www.dodir.mil/waveform_submission. Waveforms are analyzed using the criteria identified by the JTNC in the waveform analysis process.

g. Information on all waveforms available or under review for use by the DoD, including those developed by public sources (e.g., a U.S. Government laboratory) or private entities, will be stored in the DoD IR. The DoD IR will document all waveforms in the waveform analysis process. The DoD IR and tactical communication marketplace will contain information and statuses on all waveforms that are available for potential use or reuse, or are in the review process. These two repositories will inform DoD program managers and waveform developers of communication waveform products, minimize duplication of effort, and lower the cost of future waveform development.

h. The waveform analysis process begins with submission of a WAA. The Office of the DoD CIO will work with the Lead Service or Sponsor and the Director of JTNC to enter the candidate waveform or registered waveform into the process at the appropriate stage.

i. The stages of the waveform analysis process progressively steer waveform development toward formal registration by the Office of the DoD CIO and designation as a registered DoD waveform. Figure 1 depicts the main stages of the process.

j. New waveform developments within DoD are expected to enter the process at the conceptual stage.

k. If multiple DoD Components are sponsoring similar waveform technologies, the waveform sponsors are encouraged to collaborate on submission of the WAA. To the extent practical, waveform sponsors will collaborate with all program managers that use a given waveform to gather information and complete requirements of this instruction. The DoD CIO will work to resolve any differences among submissions of similar waveform technologies.

l. The Director of JTNC will ensure that waveform updates, modifications, or enhancements are tracked by this process. Any change made to a waveform that diverges from its baseline capability requirements and lifecycle sustainment plan submitted as a part of this process will be subject to another review. Changes made to a waveform while in development (before completion of the registration stage) that affect interoperability with the existing waveform or alter the parameters and features outlined by the waveform's specification, require review of the documentation of the process to describe the changes at the next stage. Waveform updates, modifications, and enhancements will be tracked by version numbers.

m. If DoD has sufficient technical information and IP rights in the waveform to support reuse, the Lead Service or Sponsor will initiate standardization through the Defense Standardization Program outlined in DoDI 4120.24 and DoD Manual 4120.24. The standardization developed or adopted through this process must adequately describe the entire waveform. If DoD does not have sufficient technical information or IP rights to support reuse, the Lead Service or Sponsor, in coordination with the USD(A&S) and DoD CIO, will determine, based on a business case analysis that considers potential cost and technical tradeoffs, whether to request additional technical information or IP rights to support DoD's reuse of the waveform.

n. The Lead Service or Sponsor will ensure that the waveform's complete software and documentation (e.g., adherence to standards) reside in the DoD IR. All content will be clearly labeled with markings of official release dates and version numbers, as well as all appropriate IP rights notices and restrictive markings. Specific materials to be submitted will be in accordance with the DoD IR entrance criteria.

o. Waveforms for which DoD has sufficient IP rights and supporting technical information to allow for reuse will be standardized to further DoD interoperability, security, and cost efficiencies. Standardization and technical materials sufficient to provide products using that waveform will be made available in the DoD IR in accordance with DoD's IP rights.

p. The Office of the DoD CIO serves as the disposition authority for waveform reviews, issuing dispositions at each stage as outlined in Table 1. Reviews will be conducted with input from the CJCS, Director of JTNC, Secretaries of the Military Departments, USD(A&S), and USD(I&S). Disposition memorandums are issued at the appropriate stages as input to the acquisition authority, waveform developer, Lead Service or Sponsor, and DoD IR as appropriate. At each stage of the review process, the DoD CIO will assess whether the candidate waveform continues to meet its originally stated requirements or whether requirements changed such that the application should be revisited.

Table 1. Waveform Review Stages and Disposition Outcomes

Stage	Purpose	Disposition Outcome
Conceptual	Determines that a new, modified, or enhanced waveform concept does not duplicate existing DoD waveform capabilities	Analysis and recommendation on continued development at the appropriate milestone to the relevant acquisition authority or waveform developer; identifies potential waveform value to DoD
Prototype	Determines the technical feasibility of further waveform development and systems integration	Analysis and recommendation on continued development at the appropriate milestone to the relevant acquisition authority or waveform developer; identifies waveform as providing unique, functionally attainable capabilities within DoD
Production	Integrates waveforms on production radios. Confirms the waveform system meets capability requirements verified by final developmental and pre-operational testing	Analysis and recommendation at the appropriate milestone decision to the relevant acquisition authority to permit DoD use in production radio or proceed to operational test
Operational	Verifies functionality in an operational system environment and that interoperability, security, and other standards are met	Analysis and recommendation at the appropriate acquisition decision point to the acquisition authority to allow DoD use of the waveform through the end of the registration stage
Registration	Verifies cataloging of all waveform materials in IR	Registration as a DoD waveform subject to recurring reviews and storage of waveform materials in the DoD IR

q. Waveform disposition recommendations are provided as input into the Defense Acquisition System (DAS), as required.

3.2. CONCEPTUAL STAGE.

a. The purpose of this stage is to analyze initial waveform concepts to determine their potential benefit to the DoD and to determine if they duplicate existing DoD waveform capabilities. The conceptual stage review allows the DoD to analyze the merits of new and innovative technologies before investing in them. This stage limits risks to the Lead Service and Sponsor by considering whether existing waveforms across the DoD can be used or modified to meet their requirements before new development begins. Similarly, this stage allows waveform

developers to obtain a review from the DoD of the potential benefits to the DoD of the new waveform development.

b. The Office of the DoD CIO will issue a conceptual stage waveform disposition memorandum to the Lead Service, Sponsor, Milestone Decision Authority (MDA), any other relevant acquisition authorities, and the JTNC, as appropriate. The memorandum will provide a recommendation for interim registration or disapproval with accompanying rationale. The memorandum will also provide an observation of the JTNC analyses in interoperability, security, reusability, and exportability and will serve as the DoD CIO's input at the appropriate milestone.

3.3. PROTOTYPE STAGE.

a. The purpose of this stage is to demonstrate that the waveform is functionally attainable on at least one prototype, existing, or legacy radio. The prototype can be implemented as an embedded radio that is part of a larger system. The Office of the DoD CIO will provide a waveform review and recommendation for the conceptual stage (or entry into the prototype stage) before this stage begins.

b. The waveform Lead Service or Sponsor will submit an updated WAA in accordance with the DoD IR entrance criteria.

c. The Lead Service or Sponsor will initiate a Global Information Grid technical profile that provides waveform implementation guidance in accordance with the Global Information Grid Technical Guidance Federation and DoDI 8410.03.

d. The Office of the DoD CIO will issue a prototype stage waveform disposition memorandum to the Lead Service, Sponsor, MDA, any other relevant acquisition authorities, and the JTNC, as appropriate. The memorandum will provide a recommendation for interim registration or disapproval with accompanying rationale. The memorandum will also provide an observation of the JTNC analyses in interoperability, security, reusability, and exportability and will serve as the DoD CIO's input at the appropriate milestone.

3.4. PRODUCTION STAGE.

a. The purpose of this stage is to demonstrate that a stable design of the completed waveform software has been successfully integrated into production radios functioning in a system. The system meets capability requirements verified by final developmental and pre-operational testing. The DoD CIO will provide a waveform review recommendation for the prototype stage (or entry into the production stage) before this stage begins.

b. This stage dictates a maturity level where the waveform has completed design and development, including developmental testing. The waveform software has no outstanding critical deficiencies, has been integrated into the radio platform, and is ready for validation in a relevant operational environment. The waveform sponsor will submit an updated WAA in accordance with the DoD IR entrance criteria.

c. The DoD CIO will issue a production stage waveform disposition memorandum to the Lead Service, Sponsor, MDA, any other relevant acquisition authorities, and the Director of JTNC, as appropriate. The memorandum will recommend either interim registration of the waveform or disapproval of the waveform with the rationale for disapproval. The memorandum will also provide an observation of the JTNC analyses in interoperability, security, reusability, and exportability and will serve as the DoD CIO's input at the appropriate milestone.

3.5. OPERATIONAL STAGE.

a. The purpose of this stage is to demonstrate waveform maturity and, if available, completeness of software and documentation. This is done by analyzing operational test results and ensuring that waveform materials are stored in the DoD IR. The DoD CIO will provide a waveform review recommendation for the production stage (or entry into the operational stage) before this stage begins. The waveform sponsor will submit an updated WAA in accordance with the DoD IR entrance criteria.

b. The DoD CIO will issue an operational stage waveform disposition memorandum to the Lead Service, Sponsor, MDA, any other relevant acquisition authorities, and the Director of JTNC, as appropriate. The memorandum will recommend either interim registration of the waveform or disapproval of the waveform with the rationale for disapproval. The memorandum will also provide an observation of the JTNC analyses with regard to interoperability, security, reusability, and exportability and will serve as the DoD CIO's input at the appropriate milestone.

3.6. REGISTRATION STAGE.

a. The purpose of this stage is to ensure that waveform software, documentation, and standards are properly catalogued, to the extent possible, before adding the waveform to the DoD IR. The DoD CIO will provide a waveform review recommendation for the operational stage (or entry into the registration stage) before this stage begins.

b. If changes are made to the waveform technical information in the DoD IR, those changes must be documented during this stage.

c. The Lead Service or Sponsor will submit the waveform standard to DISA for inclusion in the DISR, if applicable.

d. The Lead Service or Sponsor will submit the finalized Global Information Grid technical profile to the Office of the DoD CIO containing minimum interoperability implementation guidance to cover instances where the waveform is part of a system that connects to the DoD Information Networks.

e. Upon the successful completion of the operational stage, the DoD CIO will review the waveform assessment and draft a disposition waveform memorandum. This disposition memorandum will be provided to the C3LB for consideration of entrance into the DoD IR. Any waveforms disapproved by the C3LB will be provided to the Lead Service or Sponsor for

appropriate action. C3LB approved waveforms will be added to the DoD IR as a registered waveform.

3.7. DOD WAVEFORM SUSTAINMENT.

a. The purpose of this recurring activity is to ensure that registered DoD waveforms are well maintained and accurately catalogued over time. This will aid DoD efforts to reuse existing waveforms and wireless communication products.

b. The Lead Service or Sponsor will ensure that a registered DoD waveform's materials in the DoD IR are maintained in accordance with the DoD IR entrance criteria throughout the waveform's lifecycle. All materials must be marked with accurate release dates and waveform version numbers, and applicable IP rights restrictions.

c. The DoD CIO will review the DoD IR as necessary with input from the Director, DISA; CJCS; Director of JTNC; the Secretaries of the Military Departments; DIRNSA/CHCSS; USD(A&S); and USD(I&S) to retire obsolete waveforms. This review will include verification that the waveforms in the DISR match the DoD IR. At a minimum, the materials for each waveform in the DoD IR will be reviewed annually.

d. Life-cycle sustainment of the waveforms residing in the DoD IR is the responsibility of the waveform Lead Service or Sponsor. Life-cycle sustainment considerations include: maintenance; sustainment engineering; data management; configuration management; cyber-security; and protection of critical program information including anti-tamper provisions; supportability; exportability; and interoperability

3.8. EXPORTABILITY ANALYSIS.

An exportability analysis:

a. Provides technical analysis of the waveform and its associated software artifacts against published requirements for interoperability, security, and reusability, as they pertain to the transfer of the waveform capability to foreign partners. The exportability analysis will provide technical information aggregating the waveform's interoperability, security, and reusability characteristics, as well as identifying potential impact areas to support a transfer recommendation.

b. Assists DoD agencies with overseeing the protection of critical technologies of wireless communications exported under FMS or DCS and licenses or international agreements.

c. Provides a recommendation on whether the waveform capability should be transferred to foreign partners. Each recommendation will be based on an evaluation of aggregate factors that affect the waveform's capability for interoperable and secure operations within a coalition environment. This recommendation will be submitted to the Lead Service or Sponsor for review. If accepted by the Lead Service or Sponsor, the recommendation may become a formal technology transfer position and can be used by stakeholders evaluating requests via FMS or

DCS or, in the context of an international agreement, for the export of the waveform capability on a properly protected U.S. platform.

GLOSSARY

G.1. ACRONYMS.

Acronym	Meaning
C3LB	Command, Control, and Communications Leadership Board
CJCS	Chairman of the Joint Chiefs of Staff
COTS	commercial off-the-shelf
DAS	Defense Acquisition System
DCS	direct commercial sales
DIRNSA/CHCSS	Director, National Security Agency/Chief, Central Security Service
DISA	Defense Information Systems Agency
DISR	DoD Information Technology Standards Registry
DoD CIO	Department of Defense Chief Information Officer
DoD IR	DoD Information Repository
DoDD	DoD directive
DoDI	DoD instruction
DOT&E	Director of Operational Test and Evaluation
FMS	foreign military sales
IP	intellectual property
IT	information technology
JTNC	Joint Tactical Networking Center
MDA	Milestone Decision Authority
MS B	Milestone B
MS C	Milestone C
NDI	non-development item
PoR	Program of Record
PSA	Principal Staff Assistant
USD(A&S)	Under Secretary of Defense for Acquisition and Sustainment
USD(I&S)	Under Secretary of Defense for Intelligence and Security
WAA	waveform analysis application

G.2. DEFINITIONS.

Unless otherwise noted, these terms and their definitions are for the purpose of this issuance.

TERM	DEFINITION
Application Programming Interface	A set of software instructions and standards that allows machine-to-machine communications.
Core	Core waveforms are those waveforms that are essential to conducting command and control in a multi-domain, joint or combined environments.
DoD IR	The information system site storing the list of proposed and registered DoD waveforms, waveform software code, and supporting design, test, and waveform analysis materials. The DoD IR contains sufficient information to describe the waveform adequately, including but not limited to, linking to the appropriate software code, hardware description files, data dictionaries, parameters, development environment files necessary for compilation, and documentation to allow a user to assemble and compile or otherwise implement a waveform.
foreign disclosure	Displaying or revealing classified national intelligence or controlled unclassified information, whether orally, in writing, or in any other medium, to any foreign entities without providing the foreign entity a copy of such information for retention.
IP Rights	The license rights or other legal authorization to use, modify, reproduce, perform, display, release, or disclose IP (e.g., patents, copyrights, trade secrets, trademarks).
IT	Any equipment, or interconnected system(s) or subsystem(s) of equipment, that is used in the automatic acquisition, storage, analysis, evaluation, manipulation, management, movement, control, display, switching, interchange, transmission, or reception of data or information by the agency. Includes computers, ancillary equipment (including imaging peripherals, input, output, and storage devices necessary for security and surveillance), peripheral equipment designed to be controlled by the central processing unit of a computer, software, firmware and similar procedures, services (including support services), and related resources.

Does not include any equipment that:

Is acquired by a contractor incidental to a contract.

TERM	DEFINITION
	Contains imbedded IT that is used as an integral part of the product, but the principal function of which is not the acquisition, storage, analysis, evaluation, manipulation, management, movement, control, display, switching, interchange, transmission, or reception of data or information. For example, HVAC equipment, such as thermostats or temperature control devices, and medical equipment where IT is integral to its operation, are not IT.
life-cycle sustainment plan	For DAS programs, this refers to the Life Cycle Sustainment Plan form. For developments outside DAS, this is the plan used by the Office of the DoD CIO and waveform sponsor to outline waveform sustainment activities, regression testing requirements, and testing thresholds. The plan will provide authority for modifying a waveform within approved performance and security parameters during sustainment. Waveform changes outside of those outlined by this plan will be subject to review according to this issuances, beginning with the Conceptual, Prototype, Production, or Operational stages, as determined by the DoD CIO and waveform sponsor.
National Security Systems	Defined in Section 11103 of Title 40, U.S. Code.
Non-Core	Non-core waveforms are typically operated by a single Service for a specific purpose within a Service-unique environment.
review process	The process for analyzing waveforms. These reviews are intended to ensure interoperability, security, reusability, exportability, and operational value of waveform technology.
tactical data link	A Joint Staff-approved, standardized communication link suitable for transmission of digital information, which interfaces two or more command and control or weapons systems via a single or multiple network architecture and multiple communication media for exchange of tactical information.
joint communication marketplace	A reference repository of vendor-submitted waveforms capabilities that may be of use to the DoD.
waveform	An electromagnetic signal-in-space, typically defined by Open Systems Interconnection model layers 1 through 3, along with the controls and processes for a desired function or application. These processes do not include the message content.

TERM	DEFINITION
waveform developer	The person, business, group, or organization responsible for designing and developing the waveform.
waveform disposition	The outcome of a waveform review as determined by the Office of the DoD CIO and key stakeholders.
wireless	Defined in DoDD 8100.02.

REFERENCES

- Chairman of the Joint Chiefs of Staff Instruction 5123.01H, “Charter of the Joint Requirements Oversight Council (JROC) and the Implementation of the Joint Capabilities Integration and Development System,” August 31, 2018
- Deputy Secretary of Defense Memorandum, “Enhancing DoD’s Joint Tactical Networks and Datalink Modernization,” March 29, 2019
- DoD Directive 5143.01, “Under Secretary of Defense for Intelligence and Security (USD(I&S)),” October 24, 2014, as amended
- DoD Directive 5144.02, “DoD Chief Information Officer (DoD CIO),” November 21, 2014, as amended
- DoD Directive 5230.11, “Disclosure of Classified Military Information to Foreign Governments and International Organizations,” June 16, 1992
- DoD Directive 8100.02, “Use of Commercial Wireless Devices, Services, and Technologies in the Department of Defense (DoD) Global Information Grid (GIG),” April 14, 2004
- DoD Instruction 2040.02, “International Transfer of Technology, Articles, and Services,” July 31, 2017
- DoD Instruction 4120.24, “Defense Standardization Program (DSP),” July 13, 2011, as amended
- DoD Instruction 5000.02, “Operation of the Adaptive Acquisition Framework,” January 23, 2020
- DoD Instruction 8330.01, “Interoperability of Information Technology (IT), Including National Security Systems (NSS),” May 21, 2014, as amended
- DoD Instruction 8410.03, “Network Management (NM),” August 29, 2012, as amended
- DoD Manual 4120.24, “Defense Standardization Program (DSP) Procedures,” September 24, 2014, as amended
- Executive Order 12333, “United States Intelligence Activities,” December 4, 1981
- Memorandum of Agreement between the Department of Defense and the Department of Homeland Security Regarding Department of Defense and U.S. Coast Guard Cooperation on Cybersecurity and Cyberspace Operations, January 19, 2017¹
- U.S. Code, Title 10, Section 142
- U.S. Code, Title 40, Section 11103

¹ Available at <https://dcms.uscg.afpims.mil/publicmedia/2017/Jul/19/2001780017/-/1-1/0/DHS-DOD%20USCG%20CYBER%20MOA.PDF>