CHAIRMAN OF THE JOINT CHIEFS OF STAFF INSTRUCTION

J-6 CJCSI 6232.01E
DISTRIBUTION: A, B, C 21 September 2012

LINK 16 SPECTRUM DECONFLICTION

References: See Enclosure F.

1. Purpose. This instruction implements policy to ensure that use of Link 16 terminals and systems that operate in the 960-1215 MHz frequency band Time Divisional Multiple Access (TDMA) waveform operate in accordance with the National Telecommunications and Information Administration (NTIA) and U.S. Military Communications-Electronics Board (MCEB) spectrum certification guidance and ensures DoD compliance with reference a. In particular, that the operation of Link 16 systems does not exceed the spectrum certification limits for pulse density specified in reference b and identified in Enclosure C. This instruction applies to all units/users operating Link 16 in the proximity of the United States and its Possessions (US&P)[1]. This instruction provides the policy, definitions, organizational responsibilities, and procedures to manage and use Link 16 systems through the control, monitoring, supervision, and management of pulse densities, referred to as pulse deconfliction.

2. Cancellation. CJCSI 6232.01D, 15 December 2006, "Link-16 Spectrum Deconfliction," is canceled.

3. Applicability. This instruction applies to the Combatant Commands, Services, and Agencies (C/S/A) operating Link 16 equipped systems within 200 nautical miles of the coastal US&P. This instruction also applies to U.S. link managers and Deconfliction Authorities (DA) in their management of Link 16 operations with foreign and/or coalition units within 200 nautical miles of the coastal US&P. Pulse density limits and deconfliction policies contained in this instruction do not apply during armed conflict or the exercise of self-defense to the extent necessary for U.S. forces and participating foreign and/or coalition forces.

[1] US&P is referenced in accordance with reference f.

4. Policy

a. Link 16 systems must not cause harmful interference to navigational aids operating in the same frequency band (including Identification Friend or Foe [IFF], Tactical Air Navigation [TACAN] and Distance Measuring Equipment [DME]). Link 16 system operations must comply with specific frequency assignments granted for specific geographic and/or operational areas. All units operating Link 16 systems are required to comply with the operational and terminal restrictions and requirements contained in Enclosure C. Link 16 system operations shall be deconflicted:

(1) Within geographic and operational areas, to ensure local pulse densities do not exceed assignment restrictions.

(2) With concurrent operations in adjacent or overlapping geographic areas, to ensure composite pulse density restrictions are not exceeded.

b. Individual units will deconflict operations to ensure compliance with frequency assignment restrictions. If local units are unable to deconflict, the first common commander will perform this function. In cases where no common commander exists or where such coordination is not possible, the Joint Staff/J-6 will serve as the final Link 16 system DA and will ensure operations comply with the restrictions cited in this instruction.

c. Outside the US&P

(1) Link 16 system operations within foreign territories shall be coordinated with host nation (HN) governments in accordance with respective Combatant Command directives and HN frequency spectrum restrictions.

(2) General guidance regarding international frequency clearances may be found in either the JTIDS/MIDS Spectrum Users Guide found in the references folder at https://www.my.af.mil/gcss-af/USAF/site/ACC/A3/A3C/A3CJ or in the Link 16 Multinational Working Group Notebook at http://www.mnwg.org.[2] These documents can serve as a starting point for understanding international Link 16 frequency clearance restrictions, to include specific country pulse deconfliction requirements, and requesting appropriate clearances to conduct Link 16 operations worldwide.

5. Definitions. See Glossary.

6. Responsibilities. See Enclosure A.

[2] www.mnwg.org is a United Kingdom sponsored website for the collaboration of multinational Link 16 users.

7. Summary of Changes. This revision clarifies the business process, organizational roles, responsibilities, and procedures for conducting deconfliction within the US&P. It also reflects the most current restrictions and requirements on Link 16 system operations based on NTIA/MCEB guidance.

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

9. Effective Date. This instruction is effective immediately.

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Lieutenant General, U.S. Army
Director, Joint Staff

Enclosures:

A - Organizational Responsibilities
B - United States and its Possessions Procedures
C - Restrictions and Requirements
D - Platform Distance Separation Requirements
E - DOD Chief Information Officer Memorandum
F - References
GL - Glossary

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ENCLOSURE A

ORGANIZATIONAL RESPONSIBILITIES

1. Joint Staff/J-6. The Director for Command, Control, Communications, and Computers, is assigned primary responsibility for ensuring compliance with pulse deconfliction restrictions. The Joint Staff/J-6 shall:

a. When necessary, specify the Link 16 system DA for joint or combined Link 16 operations.

b. Serve as final DA when deconfliction cannot be achieved at a lower level.

c. Monitor execution of policy to ensure pulse deconfliction restrictions are met by Link 16 system equipped units.

d. Serve in Link 16 Pulse Deconfliction Server (LPDS) Integrated Product Team (IPT) and Configuration Control Board (CCB) capacity as stipulated in reference e.

2. Joint Staff/J-7. The Joint Interoperability Division (JID) shall:

a. Operate and administer the LPDS software and assist users in its operation. As the LPDS administrator, the JID will ensure events are updated, as required, to reflect the appropriate status of any Temporary Frequency Assignments (TFA).

b. Assist Joint Staff/J-6 in developing deconfliction policies and monitoring execution to ensure compliance for Link 16 system operations, exercises, and tests.

c. Provide technical advice to the Joint Staff/J-6 in the accomplishment of pulse deconfliction responsibilities as outlined in this instruction.

d. Ensure appropriate courses taught by the Joint Multi-Tactical Data Link School incorporate Link 16 system deconfliction training for frequency managers, operators, and technicians.

e. Serve as a point of contact for C/S/A and joint task force commanders providing assistance with Link 16 network selection and deconfliction issues utilizing the data available through the service Web sites as needed to support this effort. The JID maintains the Link 16 Joint Network Design Library (JNDL) as a virtual, net-centric collection of web sites to assist in pulse deconfliction and all aspects of Link 16 system network distribution and

operations. The JNDL consists of Link 16 data located on the JID Web site and on the four Service (USN, USAF, USA, and USMC) Network Design Facility (NDF) Web sites.

f. Perform operational related support functions.

g. Serve in LPDS IPT and CCB capacity as stipulated in reference e.

3. Combatant Commands, Services, and Agencies (C/S/A) shall:

a. Ensure subordinate commands using Link 16 system terminals have adequate guidance and resources to deconflict operations at the lowest level possible. This includes designation of user privileges on the LPDS for use during pre-mission planning (see Enclosure B).

b. Provide policy, guidance, and procedures to coordinate operations with foreign services and/or HN governments whenever those HN governments develop and implement Link 16 system frequency assignment procedures.

c. Assign/designate Deconfliction Coordinators (DCs), as required. An appropriate number of DC assignments should be made to maximize efficiency in deconflicting training events and to eliminate the possibility of uncoordinated operations occurring. DCs may be assigned geographically by command authority or by individual unit.

d. Serve as DA when deconfliction cannot be achieved at a lower level.

e. Ensure all subordinate commands using Link 16 system terminals have LPDS viewing privileges.

f. Ensure acquisition programs that provide Link 16 capability (e.g., Multifunctional Information Distribution System) and its platform integration are designed to enable users to comply with this instruction.

g. Ensure that subordinate commands comply with NTIA terminal periodic verification and terminal Electromagnetic Compatibility (EMC) feature event monitoring and data storage requirements. Stored data shall be provided to the NTIA and Federal Aviation Administration (FAA) upon request via the Service Spectrum Management Offices (SMO) and Navy & Marine Corps Spectrum Center (NMSC).

h. Ensure subordinate commands operating outside of the US&P comply with HN frequency clearances, to include documentation and national/ coalition (e.g., NATO) reporting requirements.

i. Services shall resource LPDS lifecycle sustainment IAW reference g (see Enclosure E).

4. Link 16 System DA. The Link 16 system DA is the first commander common to both units requiring pulse deconfliction. In the U.S., if there is no common commander (e.g., arbitration is required between two Combatant Commands or an operational unit and a test and evaluation unit), the Joint Staff/J-6 will serve as the DA. Combatant Commanders will provide guidance for DAs within their AORs, as appropriate, based upon the requirements contained in the individual HN's frequency clearance. The JID can provide technical advice and recommendations to any Link 16 system DA when requested.

5. Link 16 System DCs. DCs schedule Link 16 system operations in the LPDS. DCs shall:

a. Coordinate with the JID to ensure that Joint Operating Areas (JOAs)[3] are defined in the LPDS, as necessary, to support the scheduling of Link 16 operations. JOAs must be as small as possible while still containing the expected area of operations.

b. Make entries in the LPDS that specify date and time, JOA, and anticipated Time Slot Duty Factor (TSDF) for all planned Link 16 system unit(s) operations for which the DC has responsibility. Entries must reflect, to the maximum extent possible, the planned use.

c. Using the LPDS, DCs will deconflict with other same-area or adjacent JOA users to ensure TSDF and contention use restrictions are met. Promulgate, as necessary, operating/utilization instructions to represented units to comply with restrictions. All Link 16 system use must be equal to or less than what is entered into the LPDS.

d. When required, conduct coordination with other DCs to prioritize use. When coordination does not resolve prioritization issues, coordinate with the appropriate DA.

6. Unit/Staff Planners. Unit/staff planners responsible for planning Link 16 operations, exercises, tests, or evaluations will:

a. Contact the Joint Frequency Management Office (JFMO) or Service SMO for specific requirements, and to ensure an adequate frequency assignment for the desired area of operations has been approved.

[3] The term JOA refers specifically to the geographic areas defined in the LPDS and does not necessarily coincide with any JOAs defined by Combatant Commanders.

b. In cases where no assignment exists, or if the existing assignment is insufficient for the scope of operations, submit a TFA request in accordance with frequency management directives. The approved frequency assignment must be in place prior to commencement of operations. Frequency assignment requests and airspace coordination requests are two separate processes in both format and routing; approval of one does not imply approval of the other.

c. Comply with frequency assignment restrictions. DA coordination and LPDS entry is required even when complying with an existing permanent frequency assignment. This ensures unused margin is available for other units within the same geographic area (further explanation may be found in Enclosure B, paragraph 2, "Coordination Procedures").

d. Ensure participating Link 16 system units are included in the coordination process and are briefed regarding specific frequency assignment restrictions.

e. Make LPDS entries when authorized.

7. Network Design Facilities. Each Service has an NDF that designs, builds, catalogs, stores, and maintains all C/S/A approved Link 16 networks. Link 16 networks provide each participant designed into the network the ability to exchange tactical data through their platform IDL. The IDL provides each platform with pre-assigned sets of time slots to transmit and receive J-series messages on the Link 16 interface. The NDFs shall:

a. Serve as a point of contact for assistance with Link 16 network selection and generation.

b. Have Service platform load files readily available to assist with spectrum deconflictions.

c. Collaborate among NDFs to ensure each network design takes into consideration the capabilities, limitations, and information exchange requirements for each Service-specific platform that could operate on the network.

d. Serve in LPDS IPT and CCB capacity as stipulated in reference e.

8. Deconfliction Organization Relationship. See Figure 1 for block diagram of the descriptions contained within this enclosure.

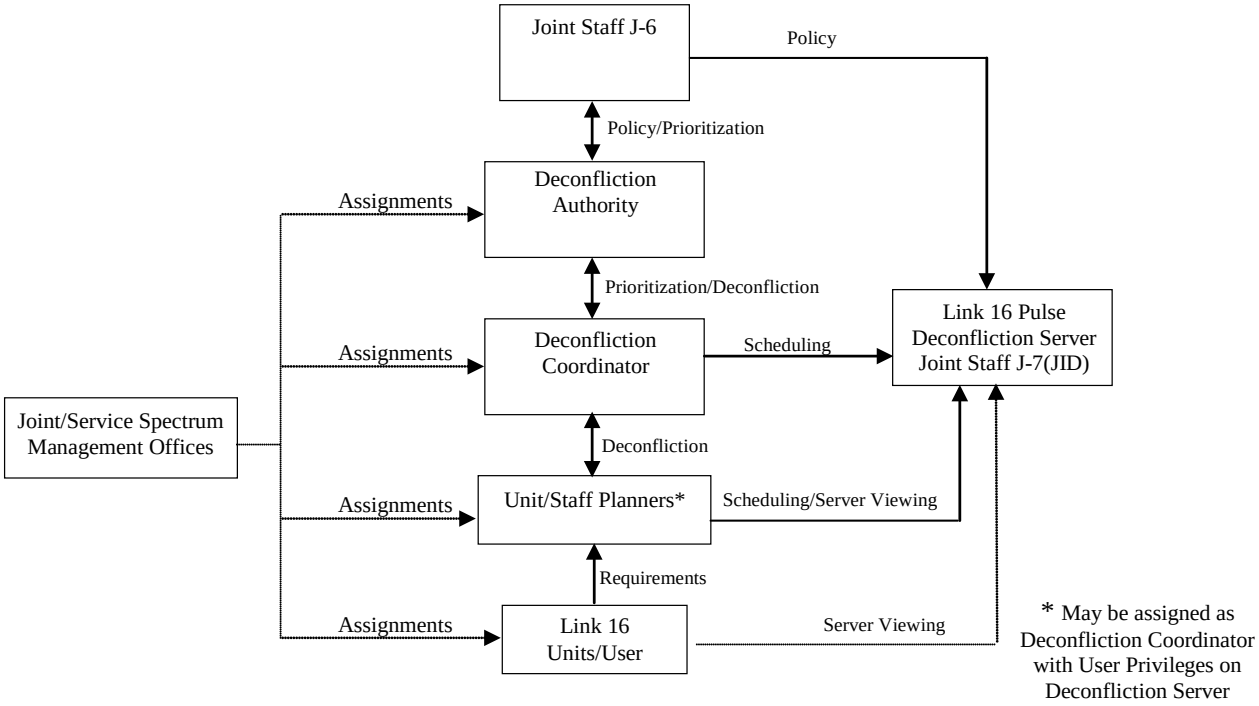

Figure 1. Organizational Relationships

9. Units/Users. Units/Users shall comply with the restrictions contained at Enclosure C and the NTIA terminal periodic verification requirements and terminal EMC features related event monitoring and data storage requirements by accomplishing the following:

a. For terminals that operate continuously, either perform manually initiated built-in test (BIT) or place the terminal in a powered down state in order to run start-up BIT (through either a STANDBY mode or an OFF mode) at least once every 30 days.

b. Establish and perform provisions for downloading and maintaining the storage of terminal EMC features related event data within maintenance records for a period of one year.

c. Provide the maintenance records to NMSC via the Service SMO, upon request from the NTIA/FAA. The event data will include the date, start and end times of:

(1) Occasions where there are transmit inhibits, along with the identity of the failure that caused the inhibition for terminals that store this information.

(2) Occasions when the terminal is switched from a full EMC Protection Mode to Exercise or Combat Mode.

(3) Instances when the terminal is placed in the high power mode (greater than 200 watts).

10. Navy and Marine Corps Spectrum Center. The NMSC shall act as the DoD single point of contact to the NTIA and FAA for Link 16 spectrum matters. NMSC will:

a. Coordinate all user requirements that exceed the peacetime spectrum certification geographic area pulse limits with the FAA to obtain temporary authorization to utilize Link 16 systems at the increased levels.

b. Provide terminal maintenance records upon NTIA/FAA request. NMSC shall coordinate with the Service SMO to request this data from the units/users.

c. Provide official input of LPDS CCB outcomes and other Link 16 concerns surrounding the LPDS to the NTIA Spectrum Planning Subcommittee (SPS) for necessary action.

11. Space and Naval Warfare Systems Command (SPAWAR) Chief Engineer's Office 5.0. SPAWAR shall:

a. Act as configuration and control manager for the LPDS software and will ensure that modifications and upgrades meet NTIA spectrum certification and user interface requirements.

b. Chair the CCB in accordance with reference e.

c. Provide LPDS CCB outcomes and resultant actions to the NMSC in support of official DoD correspondence with DoD Chief Information Officer, FAA, and the NTIA SPS.

ENCLOSURE B

UNITED STATES AND ITS POSSESSIONS PROCEDURES

1. The Link 16 Pulse Deconfliction Server. The LPDS, formerly known as the JTIDS/MIDS Deconfliction Server (JDS), is an automated internet-based system to support the coordination process within the US&P. Units/users operating outside of the US&P will work through the locally established procedures with appropriate HN/coalition (e.g., NATO) organization(s) to ensure operations are properly deconflicted and documented as required by HN and coalition procedures. Link 16 system pulse deconfliction is most effectively accomplished by keeping coordination at the lowest level possible. Future increases in the number of Link 16 system equipped units will result in an increase in geographic overlap for terminal operations and a corresponding increase in the requirements for coordination.

a. All Link 16 system activity will be coordinated through the LPDS. The appropriate DC (or unit/staff planner when authorized) will make entries into the LPDS prior to any Link 16 system operation.

b. The LPDS is accessible at various levels. C/S/As will determine/ designate user and viewer level assignments for their subordinate commands.

c. For routine operations, coordination and scheduling are handled by inputs from each unit's planned activity through the LPDS. As training opportunities are identified, users may coordinate directly with each other to establish networks that adhere to the pulse density limitations for the intended geographical areas.

d. For complex exercises, tests, demonstrations, and special operations, the appropriate DC (or unit/staff planner when authorized) will ensure adherence to pulse deconfliction restrictions and procedures and make appropriate LPDS entries.

(1) DCs (or unit/staff planner when authorized) will ensure Link 16 system operations are coordinated with their appropriate C/S/A counterparts and entered into the LPDS. Entries will be completed as part of the normal planning process and should be accomplished as far in advance as airspace coordination is accomplished. Unit/staff planners must incorporate appropriate frequency assignment restrictions into planned Link 16 system operations.

(2) If mission requirements exceed the restrictions of the existing frequency assignment, Link 16 system TFAs may be granted on a case-by-case

basis. Unit/staff planners should request TFAs through the appropriate Service SMO.

e. In the case of conflicting operations, DCs will deconflict operations to ensure compliance with local frequency assignments. Conflicts between DCs not resolved locally will be elevated to the DA.

2. Coordination Procedures

a. Documentation accompanying existing or new network designs will include a Network Description Document that can be used to calculate network TSDF information for use in scheduling operations on the LPDS. These documents/files provide the necessary information for Data Link Managers (such as the Joint Interface Control Officers) and DCs to verify unit participation, calculate expected TSDF, and determine appropriate operational measures to ensure compliance. Assistance can be obtained by contacting the JID or Service NDFs.

b. Unit/staff planners must accurately define operational requirements to ensure complete TSDF calculations can be made for a given network and specific participants. TSDF values listed for an operation on the LPDS should be sufficient to satisfy operational requirements without overstating them. Doing so will ensure maximum use of available TSDF by all requesting users within the same geographic area.

c. Unit/staff planners will review existing frequency assignments (available from the JFMO and SMO) to determine if they are adequate for the proposed operation or training event. The JID can assist in determining pulse deconfliction requirements.

(1) If an existing frequency assignment is adequate, the event will be scheduled through the LPDS.

(2) If a frequency assignment does not exist for the area of operations, or existing assignments do not meet the operational requirements, the unit/staff planner will submit either a permanent frequency assignment request for a new area or a TFA for situations where the permanent assignment does not meet requirements. Enclosure C addresses conditions and restrictions for spectrum certifications and frequency assignments.

(3) For routine request, the FAA requires a minimum of 30 days lead to process TFA request. To allow for review and coordination, TFA should be submitted to NMSC 45 days prior to need date. If lead time is not met, unit planner/requester should include a mission/operation impact statement.

d. The DC (or unit/staff planner when authorized) will make appropriate entries to the LPDS for the planned event. Operations may commence only after the event is identified as an authorized event into the LPDS. See Figure 2 for the process involved surrounding the use of the LPDS.

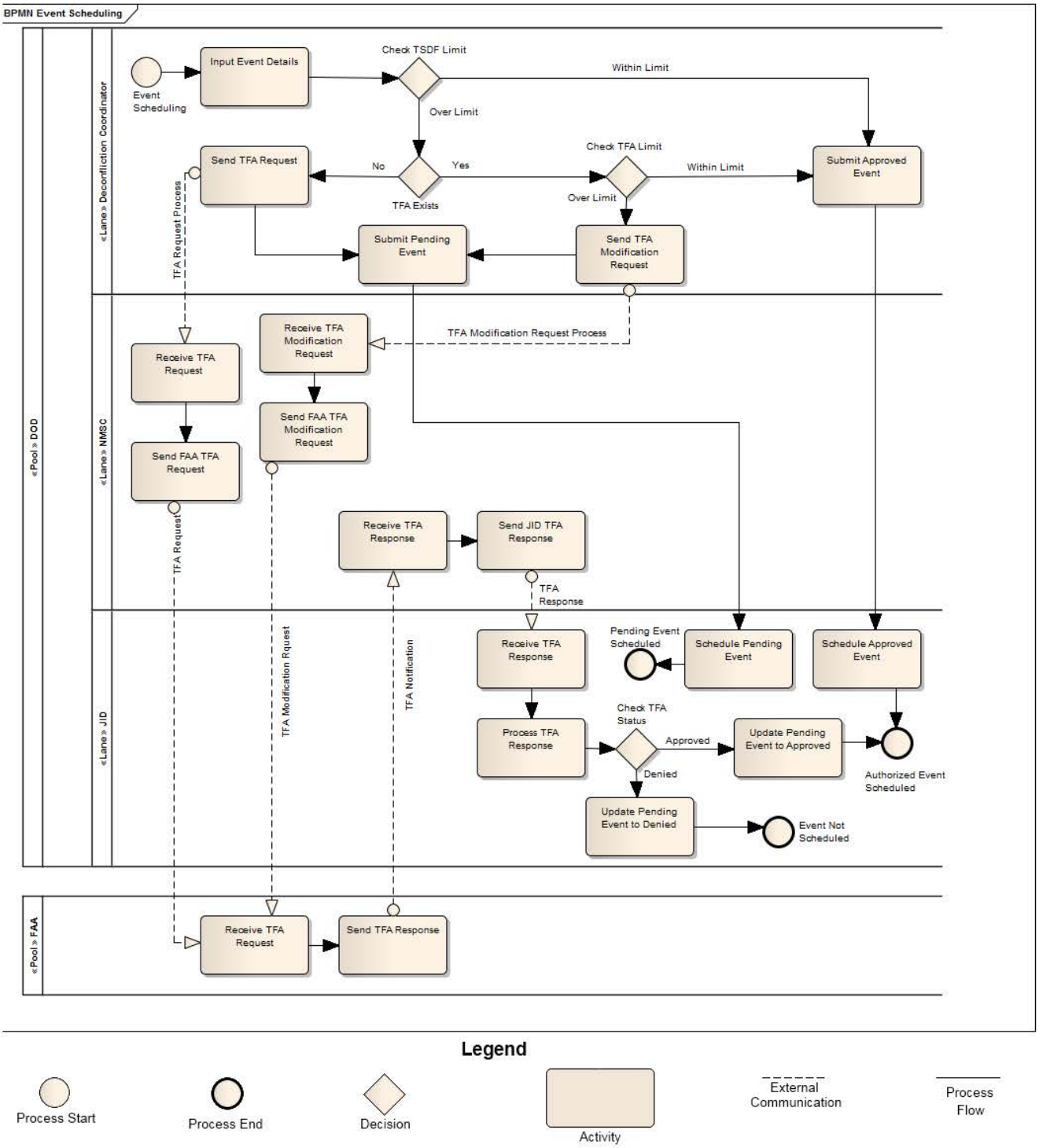

Figure 2. LPDS Event Scheduling Surrounding the TFA Approval Process

(1) Multiple operations within a single geographic area may be scheduled as a single event, or each DC (or unit/staff planner when authorized) may make individual LPDS entries.

(2) The DC (or unit/staff planner when authorized) will identify the timing and operational requirements for a scheduled event, and will enter these requirements into the LPDS. If the event can be accommodated so that it, along with all previously scheduled operations, comply with the spectrum certification conditions, then the event will be scheduled as an authorized event. The LPDS will alert the DC if the submitted TSDF exceeds the spectrum certification limits or any TFA limits that may be in effect.

(3) Options are available in cases where mission requirements exceed pulse density restrictions. The JID or the appropriate Service NDF can provide technical advice to reduce the overall TSDF. Other possible solutions include:

(a) Provide different operating times to units within a single geographic area. A review of LPDS data base event reports showing the times for conflicting operations will assist in finding alternative times.

(b) Establish an operational procedure to limit network capacity by individual units or reduce the number of participants, ensuring total pulse density in any given area complies with restrictions.

(c) Change the geographical disposition of forces to reduce the pulse density in an area where LPDS use is particularly heavy. A review of LPDS database event reports showing the locations or JOAs for the conflicting operations will assist in finding alternative operational areas.

(4) If the pursuit of the options in paragraph 2.d.(3) above is unsuccessful, then the DC shall schedule a pending event into the LPDS. The DC or the unit/staff planner will then submit a TFA request through their Service SMO chain of command through NMSC to the FAA. This request could be to create a new TFA or to modify an existing TFA.

(a) FAA will review the new or modified TFA request and provide response to the NMSC.

(b) NMSC will forward the response to the Service SMO, DC, or unit/staff planner, and the JID LPDS administrator.

(c) If the FAA response is positive, the LPDS administrator shall change the scheduled pending event into an authorized event. If the FAA response is negative, the event will remain as pending. The DC or unit/staff planner shall be notified of the outcome.

e. The DA, Combatant Commander, or Joint Staff/J-6 are the final authority to resolve issues when deconfliction cannot be achieved at a subordinate level.

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ENCLOSURE C

RESTRICTIONS AND REQUIREMENTS

1. Link 16 System Restrictions & Requirements. The restrictions and requirements listed in this enclosure are derived from the spectrum certification (Interdepartmental Radio Advisory Committee Document 35883, see reference c) issued by the NTIA for peacetime operations. NMSC shall coordinate with the FAA any time operational requirements exceed the peacetime conditions identified in this enclosure. Users should verify, through their Service SMO chain of command, the actual restrictions for their respective operating areas as some locations may be more or less restrictive than others. It should be noted that FAA-imposed restrictions contained in a particular frequency assignment always take precedence over the restrictions in a previously approved area assignment. Operational requirements above the restrictions are handled on a case-by-case basis and ultimately through NMSC to the FAA. Requesters should allow additional lead-time and include detailed justification in their waiver requests.

2. Geographic Area TSDF Limitation

a. No more than 100 percent TSDF is permitted within a 100 nautical mile (nm) radius circle drawn around each Link 16 system terminal.

(1) 100 percent TSDF is defined as 396,288 pulses per 12-second interval, regardless of the number of pulses per time slot that are actually being used (not necessarily 100 percent of time slots).

(2) TSDF is always based on assigned time slots for participating platforms, whether or not transmission occurs.

b. In addition, the total TSDF within a circle of radius 370 kilometers (200 nm) constructed around any Link 16 system TDMA terminal shall not exceed 400 percent.

3. TSDF Limitations for Individual Terminals. Any TDMA terminal, or closely spaced group of ground or stationary/slow moving TDMA airborne terminals, within a 3 nm radius about each TDMA terminal, shall be limited to a combined total 50 percent TSDF. The 50 percent TSDF limitation when combined with the 100 percent and 400 percent TSDF limitations for the geographic area in the paragraph above is called the 100/50 (300) TSDF limitation.

4. Voice Operations. Link 16 system voice operations are allowed on up to two channels (time slot pools), subject to an overall geographic area TSDF calculation that is based on the number of voice nets in use, multiplied by the

voice pool TSDF, multiplied by a Usage Factor which is dependent on the number of users assigned to a particular voice net. The Usage Factor shall be 1 when the number of users equals 1 to 12, 2 when the number of users equals 13 to 20, and 3 when the number of users is greater than 20. In determining platform compliance with the TSDF restrictions of this document, platforms will include each TDMA voice transmission.

5. Multinet Operations. Multinet operations are permitted.

6. Time Slot Message Structures. Terminal transmissions containing up to and including 444 pulses per time slot are permitted.

7. Adjacent Time Slots. Transmission in adjacent time slots is permitted.

8. Contention Transmissions

a. Contention transmissions including Repromulgation Relay (RR), Time Slot Reallocation (TSR), and Machine Controlled Contention shall be permitted.

b. Machine Controlled Contention, also known as Random Access,[4] includes Round Trip Timing Broadcast (RTT-B) mode, Precise Participant Location and Identification (PPLI), Initial Net Entry (INE), Fighter-to-Fighter, and Conditional Paired Slot Relay (CPSR). Total contention transmission TSDF, which is the sum of RR, TSR, and Machine Controlled Contention in paragraph (1) below, shall not exceed 25 percent. If, however, all Machine Controlled Contention other than RTT-B, PPLI, and INE is limited to use by fast-moving aircraft, then contention transmission TSDF can be increased to the limit of 33 percent. With respect to counting toward the 100 percent TSDF geographic area limits, the platform TSDFs and the TSR geographic area TSDF shall be summed. The TSDF for contention, participating platforms, and the geographic area shall be counted as follows:

(1) Contention Transmission TSDF

(a) The RR contribution to contention TSDF count is equal to the total TSDF in which relaying can occur times one third; i.e., using the originator time slot TSDF times one third. The granularity of the RR jitter step size is no less than 10 microseconds.

(b) The TSDF from centralized TSR is not to be counted toward the contention TSDF. For decentralized TSR, the contention TSDF count shall be equal to the total TSDF in which TSR can occur multiplied by a factor X. If the

[4] This is the contention (random) transmit access mode time slot assignments; see MIL-STD6016, *"Tactical Data Link (TDL) 16 Message Standard."*

number of TSR participants does not exceed the capacity of the reallocation message, X=1/4; otherwise, X=1/3.

(c) The Machine Controlled Contention contribution to the contention is equal to the TSDF of the contention pool multiplied by one-half.

(2) Platform TSDF

(a) The platform TSDF from RR is equal to the TSDF of the time slots in which the platform could originate or relay; i.e., one half of the time slots assigned to the originator plus one half of the sum of all the time slots assigned to other originators in which the terminal could be instructed to relay.

(b) The platform TSDF from TSR transmissions is equal to the TSDF of the TSR time slots in which the platform could transmit; i.e., 22 percent or 60 percent of the TSR pool size depending on the specific platform initialization.

(c) The platform TSDF from Machine Controlled Contention is equal to the platform contention access rate over a 12-second frame for that platform.

(3) Geographic Area TSDF

(a) The geographic area TSDF contribution due to RR is equal to the sum of all platform RR TSDFs.

(b) The geographic area TSDF contribution from centralized TSR transmissions is equal to the total TSDF of all the centralized TSR pools. The geographic area TSDF contribution from decentralized TSR transmissions is equal to the total TSDF of all the decentralized TSR pools multiplied by a factor X. If the number of TSR participants does not exceed the capacity of the reallocation message, X=1.25; otherwise, X=1.33.

(c) The geographic area TSDF contribution due to Machine Controlled Contention is equal to the sum of the platform Machine Controlled Contention TSDFs.

9. Restrictions Near TACAN and DME Beacons

a. Surface-based Link 16 terminals will be located such that TACAN, conventional DME (DME/N) and precision DME (DME/P) beacons will be protected from TDMA signals that exceed a peak power level of minus 33 decibels relative to one milliwatt (dBm) with up to 50 percent TSDF at the beacon receiver input. In the event that this signal condition cannot be complied with, 20 percent TSDF at up to minus 24 dBm is allowed. However,

this latter condition must be coordinated with NMSC and subsequently identified to NTIA. Installations where these required conditions need to be exceeded will be addressed on a case-by-case basis.

b. Table D-1, "Link 16 Distance Separation Requirements," contains theoretical worst-case location scenarios for Link 16 transmitters to protect the signal level to weaker than minus 33 dBm at TACAN/DME equipment receiver input points. Since closer distances coordinated[5] prior to use are possible with a specific site analysis for each instance in support of the minus 24 dBm standoff, these are also listed in Table D-1.

10. Restrictions Near Air Traffic Control Radar Beacon System (ATCRBS) and Mode Select (Mode S) Equipment. Surface-based Link 16 terminals will be located such that ATCRBS Interrogators and Mode S sensors will be protected from TDMA signals that exceed a peak power level of minus 20 dBm at the ATCRBS interrogator or Mode S sensor receiver input.

a. Table D-1 also contains theoretical worst-case location scenarios for Link 16 transmitters to protect the signal level to weaker than minus 20 dBm at ATC equipment receiver input points.

b. There are no similar restrictions on airborne Link 16 terminals.

11. Output Power. Link 16 terminals are limited to a maximum of 200 watts + 1 decibel (dB) at the terminal transmitter antenna output port.

12. Terminal EMC Features. Terminal EMC features must be operational. The Combat Mode is prohibited. The Exercise Mode shall not be used unless coordinated with NMSC or it is specifically allowed for the applicable platform within a frequency assignment. In order to comply with NTIA requirements for terminal EMC features, the terminal components must be periodically verified and terminal EMC features-related events must be monitored and stored in terminal memory.

a. To meet the periodic verification requirement, the terminal performs BIT on the EMC features monitor components. These BIT checks shall be performed at least once every 30 days for terminals that are operating continuously.

b. Individual units shall adhere to methods for downloading and storing EMC features-related data from the Link 16 terminal and platform as applicable (see Enclosure A, paragraph 9) for a period of one year. If the

[5] Coordinated operations are those requiring approval by FAA on a case-by-case basis. Uncoordinated operations can occur anywhere NMSC has pre-coordinated a TFA with FAA; Scheduling for these operations is managed solely within LPDS.

terminal does not have the capability to store this data, then this applicable information shall be kept manually for a period of one year and be available to the NMSC and NTIA upon request.

13. Required Separation Distance From ATC Equipment. Table D-1 shows the worst-case standoff distances from ATC equipment, which is required for various Link 16 system platforms. First, determine if it is possible to maintain the standoff distance indicated in Table D-1. If so, then the distance indicated is used as the minimum required separation distance from the ATC equipment. Second, if the separation distance indicated in Table D-1 cannot be maintained and meet the operational requirements, then a request for restriction easing might be obtained. During this process, NMSC performs a site analysis for the requested operation specifics. A significant reduction in the separation distance may be possible, but this is on a case-by-case basis so the received signal level into the ATC equipment does not exceed signal level limitations. The distances indicated in Table D-1 are worst-case theoretical Link 16 system to-ATC equipment antennas main beam-to-main beam gain conversion. The following subparagraphs contain general considerations to use when planning where to place Link 16 system platforms. Note that with respect to the restrictions mentioned above, the term "surface" refers to both ground-based and maritime platforms.

a. Ground. Ground-based platforms can be the most difficult to maintain sufficient separation from ground-based ATC equipment. Caution should be observed with respect to the height of the antenna and the range and bearing from the ATC equipment. See Table 3.

b. Maritime. The required Link 16 system separation distances from civilian ATC equipment are essentially the same for maritime operations as those of the ground platforms. Since maritime units are mobile, they must consider all ATC equipment that may come within radio line-of-sight. See Table 3.

c. Airborne. The distance separation guidelines presented in Table D-1 for aircraft equipped with Link 16 system terminals are applicable when these aircraft are operating on the ground (e.g., ramps, runways, and taxiways).

d. Altitude Considerations. Distance separations from ATC equipment should be considered both horizontally and vertically.

e. Authorized Terminals. Link 16 terminals are approved for operation on an uncoordinated basis (i.e., geographic area frequency assignment has previously been granted) for any mobile or stationary platform or site that is identified within the approved *Application for Equipment Frequency Allocation*, DD Form 1494 (J/F 12 4413/4).

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ENCLOSURE D

PLATFORM DISTANCE SEPARATION REQUIREMENTS

Table 3. Link 16 Distance Separation Requirements (in nautical miles)

Platforms	Power (dBm)	TACAN /DME Beacons (nm), Note 4	TACAN Beacon (nm)	DME Beacon (nm)	Terminal ATCRBS (nm)	Terminal Mode S (nm)	En Route ATCRBS (nm)	En Route Mode S (nm)
ATC Equipment Threshold (dBm) >		-24	-33	-33	-20	-20	-20	-20
USMC Aircraft								
F/A-18	53	0.20	0.55	0.56	0.58	0.59	1.09	1.18
EA-6B	53	0.23	0.65	0.66	0.68	0.70	1.28	1.39
F-35 JSF CTOL	53	0.27	0.77	0.78	0.81	0.83	1.53	1.66
USMC Ground								
TAOM/AOC (Shelter Mounted)	53	0.31	0.89	0.90	0.93	0.95	1.75	1.89
CAC2S	53	0.26	0.74	0.75	0.77	0.79	1.46	1.58
TAOM/AOC (Ground Mounted)	53	0.21	0.58	0.59	0.61	0.63	1.15	1.25
TAOM/TACC TSC-131 (Ground Mounted)	53	0.25	0.71	0.72	0.75	0.77	1.41	1.53
TAOM/TACC TSC-131 (Shelter Mounted)	53	0.39	1.09	1.10	1.14	1.17	2.15	2.33
TYQ-101A CDLS (DPV-75)	53	0.27	0.76	0.77	0.79	0.81	1.49	1.62
TYQ-101A CDLS (DPV-75A)	53	0.60	1.69	1.71	1.77	1.82	3.34	3.62
TYQ-82, ADCP(DPV-75)	53	0.27	0.76	0.77	0.79	0.81	1.49	1.62
TYQ-82, ADCP (DPV-75A)	53	0.83	2.34	2.37	2.45	2.51	4.61	5.00
ARMY								
ADA	53	0.21	0.59	0.59	0.62	0.63	1.16	1.26
ABMOC	53	0.24	0.68	0.69	0.71	0.73	1.35	1.46
PATRIOT	53	0.29	0.82	0.83	0.85	0.87	1.61	1.74
JTAGS/AMDPCS/FAADC2I	53	0.19	0.53	0.53	0.55	0.57	1.04	1.13
FAADC2I	53	0.24	0.68	0.69	0.71	0.73	1.35	1.46
SHORAD	53	0.19	0.53	0.53	0.55	0.57	1.04	1.13
THAAD	53	0.24	0.69	0.69	0.72	0.73	1.35	1.47
MEADS	53	0.24	0.68	0.69	0.71	0.73	1.35	1.46
Aerostat	53	0.13	0.37	0.38	0.39	0.40	0.73	0.79
JLENS	53	0.24	0.68	0.69	0.71	0.73	1.35	1.46
JLENS (RS Data)	53	0.13	0.37	0.38	0.39	0.40	0.73	0.79

Table 3. Link 16 Distance Separation Requirements
(in nautical miles)

Platforms	Power (dBm)	TACAN /DME Beacons (nm), Note 4	TACAN Beacon (nm)	DME Beacon (nm)	Terminal ATCRBS (nm)	Terminal Mode S (nm)	En Route ATCRBS (nm)	En Route Mode S (nm)
ATC Equipment Threshold (dBm) >		-24	-33	-33	-20	-20	-20	-20
AIR FORCE Aircraft								
E-3 Fore	53	0.23	0.65	0.66	0.68	0.70	1.29	1.39
E-3 Aft	53	0.28	0.79	0.80	0.83	0.85	1.56	1.69
F-15 Class 2	53	0.21	0.59	0.60	0.62	0.64	1.17	1.27
F-15 MIDS FDL	49	0.13	0.38	0.38	0.39	0.40	0.74	0.80
F-16	53	0.24	0.69	0.70	0.72	0.74	1.36	1.48
E-8C JSTARS	53	0.17	0.47	0.47	0.49	0.50	0.93	1.00
B-1B	53	0.25	0.70	0.70	0.73	0.75	1.37	1.49
B-2	53	0.07	0.19	0.19	0.20	0.20	0.38	0.41
EC-130H	53	0.17	0.47	0.47	0.49	0.50	0.92	1.00
AC-130H/U	53	0.19	0.54	0.54	0.56	0.58	1.06	1.15
C-130J	53	0.21	0.58	0.59	0.61	0.62	1.15	1.24
C-130, KC-130	53	0.17	0.48	0.49	0.51	0.52	0.95	1.03
B-727 Tester	53	0.23	0.66	0.67	0.69	0.71	1.30	1.41
B-747 YAL-1 ABL	53	0.25	0.70	0.71	0.74	0.75	1.39	1.50
B-767 AST	53	0.17	0.47	0.47	0.49	0.50	0.92	1.00
NASA XB-57 BACN	53	0.10	0.27	0.27	0.28	0.29	0.54	0.58
B-737 AFL	53	0.23	0.64	0.64	0.67	0.68	1.26	1.36
B-737 Smart Tanker	53	0.11	0.32	0.32	0.34	0.34	0.63	0.69
B-707 Paul Revere	53	0.26	0.74	0.75	0.77	0.79	1.46	1.58
B-52	53	0.15	0.42	0.42	0.44	0.45	0.82	0.89
RC-135 RJ	53	0.16	0.45	0.45	0.47	0.48	0.88	0.95
EC-135	53	0.14	0.39	0.40	0.41	0.42	0.77	0.84
KC-135 ROBE MIDS FDL	49	0.11	0.31	0.31	0.32	0.33	0.60	0.65
AIR FORCE Ground								
I-FAST Lab	53	0.19	0.54	0.54	0.56	0.57	1.06	1.15
AOC, CAOC	53	0.27	0.77	0.77	0.80	0.82	1.51	1.64
OPFAC/JTD	53	0.31	0.88	0.89	0.92	0.94	1.73	1.88
D-1A/D-1B	53	0.31	0.88	0.89	0.92	0.94	1.73	1.88
JVAN (RELNAV VAN)	53	0.49	1.39	1.41	1.46	1.49	2.75	2.98
MCE/JM/JRE/CRC	53	0.21	0.60	0.60	0.63	0.64	1.18	1.28
SJS	53	0.27	0.77	0.77	0.80	0.82	1.51	1.64
JTW, GTS	53	0.31	0.88	0.89	0.93	0.95	1.74	1.89
GMG	53	0.32	0.91	0.92	0.95	0.97	1.79	1.94
GTS GMG OTM	53	0.26	0.74	0.74	0.77	0.79	1.45	1.57
Tyndall Tower	53	0.32	0.91	0.92	0.95	0.98	1.80	1.95
ADA	53	0.21	0.59	0.59	0.62	0.63	1.16	1.26
JBECC	53	0.24	0.68	0.69	0.71	0.73	1.35	1.46

Table 3. Link 16 Distance Separation Requirements
(in nautical miles)

Platforms	Power (dBm)	TACAN /DME Beacons (nm), Note 4	TACAN Beacon (nm)	DME Beacon (nm)	Terminal ATCRBS (nm)	Terminal Mode S (nm)	En Route ATCRBS (nm)	En Route Mode S (nm)
ATC Equipment Threshold (dBm) >		-24	-33	-33	-20	-20	-20	-20
Pocket J	53	0.21	0.59	0.59	0.61	0.63	1.15	1.25
AASROM LAK	53	0.23	0.65	0.66	0.68	0.69	1.28	1.39
SJS BOSS	49	0.17	0.47	0.47	0.49	0.50	0.92	1.00
NAVY Aircraft								
E-2C/D	53	0.21	0.58	0.59	0.61	0.62	1.15	1.24
F/A-18	53	0.20	0.55	0.56	0.58	0.59	1.09	1.18
E/A-18G	53	0.20	0.55	0.56	0.58	0.59	1.09	1.18
G-1	53	0.19	0.54	0.55	0.57	0.58	1.07	1.16
H-60 Helicopters Upper	53	0.10	0.28	0.29	0.30	0.30	0.56	0.61
P-3 Orion Top	53	0.17	0.47	0.48	0.49	0.51	0.93	1.01
EP-3	53	0.12	0.34	0.34	0.35	0.36	0.67	0.72
P-8A	53	0.16	0.45	0.45	0.47	0.48	0.88	0.95
P-8A Boeing RV	53	0.22	0.63	0.64	0.66	0.67	1.24	1.35
EA-6B	53	0.23	0.65	0.66	0.68	0.70	1.28	1.39
F-35 JSF CTOL	53	0.27	0.77	0.78	0.81	0.83	1.53	1.66
NAVY Ships								
SHIPS; JTIDS	53	0.19	0.53	0.53	0.55	0.57	1.04	1.13
SHIPS; MOS	53	0.12	0.33	0.34	0.35	0.36	0.65	0.71
SUBMARINES	53	0.07	0.19	0.19	0.19	0.20	0.37	0.40

See Part I of Glossary for Acronym Definition

Note 1: Distances are worst-case theoretical Link 16-to-ATC equipment antennas main beam-to-main beam gain conversions. Distances are measured in nautical miles.

Note 2: Signal level with respect to the Link 16 peak signal.

Note 3: For the aircraft listed, these separation distances only apply to ground operations such as ramps, runways, and taxiways.

Note 4: TACAN/DME distances for a –24 dBm standoff are for coordinated cases where the TSDF is less than 20 percent only.

Note 5: Names of platforms evolve over time; however, the characteristics of the platform may remain the same. Any discrepancy with platform name or potential characteristics should be noted and provided to NMSC for official modification to the DD Form 1494.

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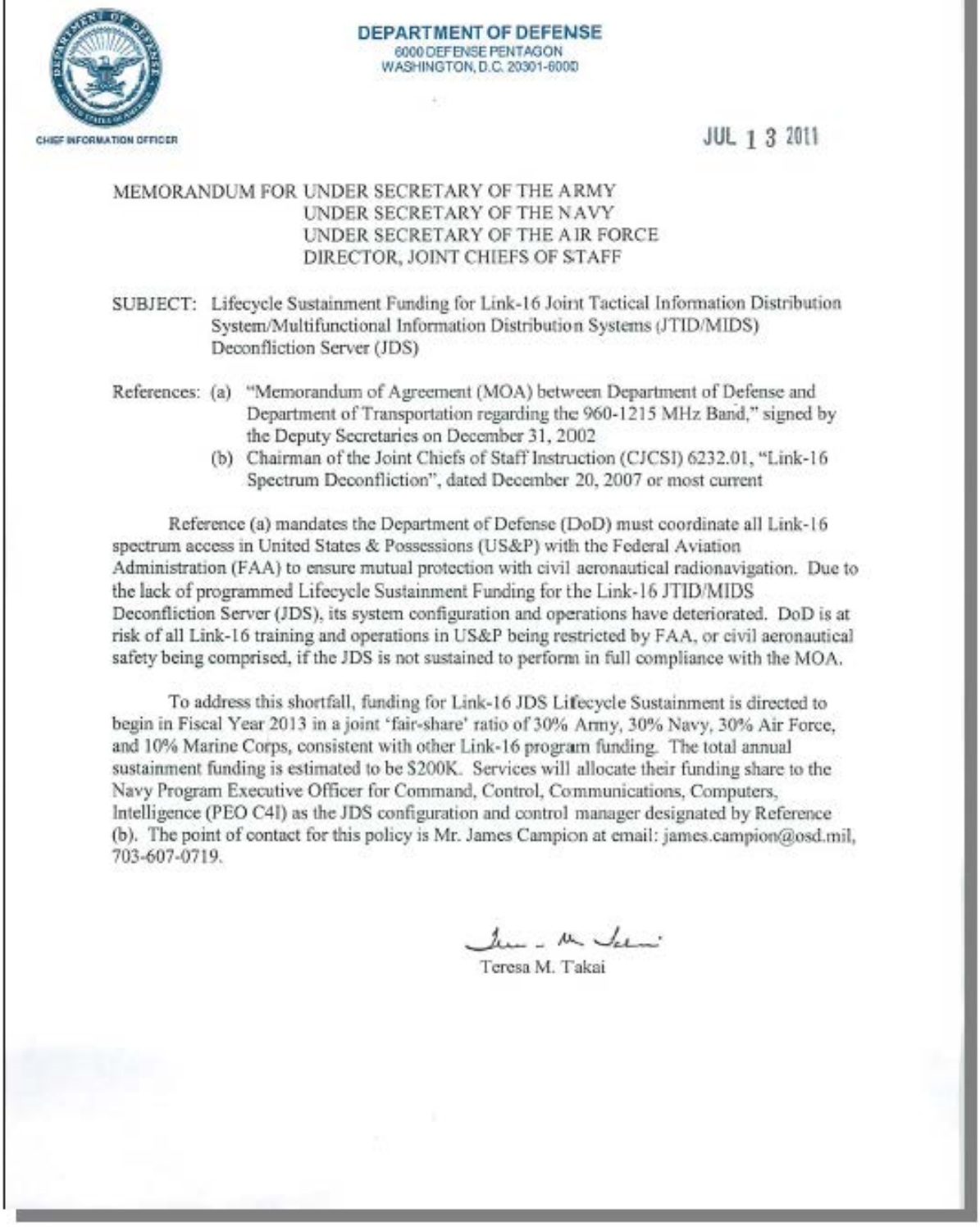
ENCLOSURE E

DOD CHIEF INFORMATION OFFICER MEMORANDUM



DEPARTMENT OF DEFENSE
6000 DEFENSE PENTAGON
WASHINGTON, D.C. 20301-6000

CHIEF INFORMATION OFFICER

JUL 13 2011

MEMORANDUM FOR UNDER SECRETARY OF THE ARMY
UNDER SECRETARY OF THE NAVY
UNDER SECRETARY OF THE AIR FORCE
DIRECTOR, JOINT CHIEFS OF STAFF

SUBJECT: Lifecycle Sustainment Funding for Link-16 Joint Tactical Information Distribution System/Multifunctional Information Distribution Systems (JTID/MIDS) Deconfliction Server (JDS)

References: (a) "Memorandum of Agreement (MOA) between Department of Defense and Department of Transportation regarding the 960-1215 MHz Band," signed by the Deputy Secretaries on December 31, 2002
(b) Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 6232.01, "Link-16 Spectrum Deconfliction", dated December 20, 2007 or most current

Reference (a) mandates the Department of Defense (DoD) must coordinate all Link-16 spectrum access in United States & Possessions (US&P) with the Federal Aviation Administration (FAA) to ensure mutual protection with civil aeronautical radionavigation. Due to the lack of programmed Lifecycle Sustainment Funding for the Link-16 JTID/MIDS Deconfliction Server (JDS), its system configuration and operations have deteriorated. DoD is at risk of all Link-16 training and operations in US&P being restricted by FAA, or civil aeronautical safety being comprised, if the JDS is not sustained to perform in full compliance with the MOA.

To address this shortfall, funding for Link-16 JDS Lifecycle Sustainment is directed to begin in Fiscal Year 2013 in a joint 'fair-share' ratio of 30% Army, 30% Navy, 30% Air Force, and 10% Marine Corps, consistent with other Link-16 program funding. The total annual sustainment funding is estimated to be $200K. Services will allocate their funding share to the Navy Program Executive Officer for Command, Control, Communications, Computers, Intelligence (PEO C4I) as the JDS configuration and control manager designated by Reference (b). The point of contact for this policy is Mr. James Campion at email: james.campion@osd.mil, 703-607-0719.

Teresa M. Takai

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ENCLOSURE F

REFERENCES

a. Memorandum of Agreement (MOA) Between Department of Defense (DOD) and Department of Transportation (DOT) Regarding the 960-1215 MHz Frequency Band, 31 December 2002

b. JTIDS/MIDS Spectrum Certification Interdepartment Radio Advisory Committee (IRAC) Document 33583/1, 25 March 2004

c. Joint Tactical Information Distribution System (JTIDS) and Multifunctional Information Distribution System (MIDS) Spectrum User's Guide Version 2.2., June 2004

d. Link 16 Multinational Ad hoc Spectrum Support Working Group Notebook, May 2011

e. Configuration Management Plan (CMP) for the Link 16 Pulse Deconfliction Server (LPDS), 7 December 2011[6]

f. Manual of Regulations and Procedures for Federal Radio Frequency Management, May 2011 Revision of the 2008 Edition, U.S. Department of Commerce, National Telecommunications and Information Administration

g. DoD Chief Information Officer Memorandum for Lifecycle Sustainment Funding for Link-16 Joint Tactical Information Distribution System/Multifunctional Information Distribution Systems (JTID/MIDS) Deconfliction Server (JDS), 13 July 2011

[6] CMP for LPDS is located in the shared documents at http://www.intelink.gov/sites/tdes/lpds/default.aspx

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GLOSSARY

Unless otherwise stated, the terms, definitions, and descriptions contained in this glossary are for the purposes of this instruction only.

PART I -- ABBREVIATIONS AND ACRONYMS

AASROM	Alaska Aerospace Surveillance and Range Operations Modernization
ABL	Airborne Laser
ABMOC	Air Battle Management Operations Center
ADA	Air Defense Artillery
ADCP	Air Defense Communications Platform
AMDPCS	Air/Missile Defense Planning and control System
AOC	Air Operations Center
AOR	Area of Responsibility
AST	Airborne Surveillance Testbed
ATC	Air Traffic Control
ATCRBS	Air Traffic Control Radar Beacon System
BACN	Battlefield Airborne Communications Node
BIT	Built In Test
BLOS	Beyond Line of Sight
BOSS	Battlefield Operations Support System
C2	Command and Control
C/S/A	Combatant Commands, Services and Defense Agencies
CAC2S	Common Aviation C2 System
CCB	Configuration Control Board
CDLS	Communications Data Link System
CMP	Configuration Management Plan
CPSR	Conditional Paired Slot Relay
CTOL	Conventional Take-Off and Landing
DA	Deconfliction Authority
dB	Decibel
dBm	Milliwatt
DC	Deconfliction Coordinator
DME	Distance Measuring Equipment
DME/N	Conventional Distance measuring Equipment
DME/P	Distance Measuring Equipment-Precision
DOD	Department of Defense
DOT	Department of Transportation
EMC	Electromagnetic Compatibility

FAADC2I	Forward Area Air Defense Command, Control and Intelligence
FAA	Federal Aviation Administration
FDL	Fighter Data Link (MIDS Low Volume Terminal (LVT)-3)
FMO	Frequency Management Office
GTS	Ground TDL System
HN	Host Nation
ICO	Interface Control Officer
IDL	Initialization Data Load
IFF	Identification, Friend or Foe
INE	Initial Net Entry
IRAC	Interdepartmental Radio Advisory Committee
JDS	JTIDS/MIDS Deconfliction Server
JFMO	Joint Frequency Management Office
JID	Joint Staff J-7/Joint Interoperability Division
JLENS	Joint Land Attack Cruise Missile Defense Elevated Netted Sensor
JMTS	Joint Multi-Tactical Data Link School
JNDL	Joint Network Design Library
JOA	Joint Operating Area
JSTARS	Joint Surveillance and Target Attack Radar System
JTAGS	Joint Tactical Ground Station
JTIDS	Joint Tactical Information Distribution System
JTW	Joint Targeting Workstation
LAK	Link 16 Alaska
LCS	Littoral Combat Ship
LPDS	Link 16 Pulse Deconfliction Server
LVT	Low Volume Terminal
MCEB	Military Communications-Electronic Board
MEADS	Medium Extended Air Defense System
MHz	Megahertz
MIDS	Multi-Functional Information Distribution System
MOA	Memorandum of Agreement
MOS	MIDS on Ship
NASA	National Aeronautics and Space Administration
NATO	North Atlantic Treaty Organization
NDF	Network Design Facility
nm	Nautical Mile
NMSC	Navy and Marine Corps Spectrum Center

NTIA	National Telecommunications and Information Administration
PPLI	Precise Participant Location and Identification
RF	Radio Frequency
RICO	Regional Interface Control Officer
RJ	Rivet Joint
ROBE	Roll-On BLOS Enhancement
RR	Repromulgation Relay
RTT-B	Round Trip Timing Broadcast
SHORAD	Short-Range Air Defense
SMO	Spectrum Management Office
SPAWAR	Space and Naval Warfare Systems Command
SPS	Spectrum Planning Subcommittee
TACAN	Tactical Air Navigation
TACC	Tactical Air Command Center
TAOM	Tactical Air Operations Module
TDL	Tactical Data Link
TDMA	Time Division Multiple Access
TFA	Temporary Frequency Assignment
THAAD	Terminal High Altitude Area Defense
TSDF	Time Slot Duty Factor
TSR	Time Slot Reallocation
US&P	United States and Its Possessions

PART II – DEFINITIONS AND DESCRIPTIONS

Data Link Manager. The individual(s) responsible for the planning, coordination, employment, and technical management of tactical data link operations as they apply to their assigned organization. The responsibilities of the data link manager as they apply to the processes of pre-mission planning, network initiation, and network control include the deconfliction of operations to insure compliance with spectrum restrictions in the area of operations. Positions such as Interface Control Officer, Regional Interface Control Officer, Link 16 Unit Manager, and Joint Interface Control Officer are examples of specific roles and positions within the Data Link Manager specialization.

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

Frequency clearance. Authorization for use of frequencies by a Radio Frequency system to operate and provide a specified class of service, (e.g., jamming, voice communications, or radio navigation).

Geographic area. A circular area with a radius, defined in the Interdepartmental Radio Advisory Committee Spectrum Certification, around each Link 16 terminal within which the Time Slot Duty Factor (TSDF) is counted. Currently, there are two areas defined: a specified base area defined by a circle with a radius of 100 nm; and an area surrounding the base area defined by a circle with a radius of 200 nm (higher TSDF may be authorized on a case-by-case basis). A specified geographic area is referred to as a Joint Operating Area within the Link 16 Pulse Deconfliction Server.

Joint Tactical Information Distribution System/Multifunctional Information Distribution System (JTIDS/MIDS). High capacity, anti-jam, secure, digital information transfer systems operating in the UHF band on 51 discrete frequencies between 969 MHz and 1206 MHz. MIDS is a technology insertion program to reduce component size and weight while maintaining all JTIDS functionality. The United States, France, Italy, Germany, and Spain are the five countries participating in the development of the MIDS terminals.

JTIDS/MIDS Network Design Library (JNDL). A virtual, net-centric collection of Web sites to assist in pulse deconfliction and all aspects of Link 16 system network distribution and operations. The JNDL consists of Link 16 data located on the Joint Interoperability Division Web site hosted by USFORSCOM at Ft. Bragg and on the four Service (USN, USAF, USA, and USMC) Network Design Facility (NDF) Web sites. Each of the NDF Web sites link to each other.

Link 16 Network Management. The process in which Link 16 network design, planning, initiation, and operations is accomplished. During this process, planning of information exchange requirements for Link 16 operations are designed and coordinated and platform loads are developed and disseminated to all of the platforms participating in that Link 16 network. The process also includes initiation of operations where real-time management of Link 16 network performance is accomplished.

Link 16 Spectrum. Link 16 systems operate on 51 frequencies within three sub-bands: 969 - 1008 MHz, 1053 - 1065 MHz, and 1113 - 1206 MHz at 3 MHz intervals using Time Divisional Multiple Access (TDMA). These terminals are designed to exclude transmissions between 1008 MHz and 1053 MHz and between 1065 MHz and 1113 MHz. Since in aircraft installations the Link 16 terminal may also provide TACAN (non-TDMA) data, those terminals are capable of using the entire 962 - 1213 MHz range for TACAN functions, but restrict Link 16 transmissions to the three sub-bands described above. The 960-1215 MHz band is use by civil and military aeronautical radio navigational systems. The ATCRBS, Mode S, and IFF systems use 1030 MHz for interrogations and 1090 MHz for replies. Civil aviation DME and Military TACAN systems operate on frequencies from 962 MHz to 1213 MHz in 1 MHz increments. Each DME/TACAN channel uses two frequencies, one for interrogations from the aircraft for information and one for beacon replies.

Pulse Deconfliction. The collaborative process of actively managing the Link 16 spectrum though the control, monitoring, supervision, and management of pulse densities to ensure compliance with specified limitations.

Pulse density. The total effective Time Slot Duty Factor resulting from the transmissions of all the Link 16 terminals within a geographic area.

Time Slot Duty Factor (TSDF). TSDF is a percentage figure relative to a base value of 396,288 pulses transmitted within a 12-second frame.

a. Link 16 pulse density is measured in terms of its TSDF. The TSDF contribution is from individual participants and networks of participants within a specified geographic area. This area is defined by circles with radii of 100 and 200 nm around individual terminals.[7] When used to quantify pulse density within a geographic area, two numbers, (e.g., 100/50), are usually provided. A third number written in parentheses [e.g., as in 100/50 (300)] can also be provided to define the additional TSDF contribution that begins at the radius edge of original 100nm geographic area and extends out an additional

[7] The current approved spectrum certification references an "any point in space" geographic management technique was to be implemented by January 2008; however, this requirement was demonstrated by DOD to NTIA and FAA as not necessary and will be removed with the next update to the spectrum certification.

100 nm (i.e., 200 nm from the terminal). This area can be referred to as the "doughnut."

b. The first number [e.g., 100 in 100/50 (300)] is the maximum percentage of pulses that may be transmitted by all the platforms combined within a specified 100 nm geographic area. The second number [e.g., 50 in 100/50 (300)] represents the maximum percentage of pulses transmitted by a single user (i.e., the single highest platform's TSDF). The third figure [e.g., (300) in 100/50 (300)] represents the additional TSDF contribution of any adjacent operations and their respective pulses originating outside the primary 100 nm geographic area.

c. Time slots may contain 144 (72 I and 72 R),[8] 258, or 444 pulses, depending on the use for the slot and the packing limit assigned. To calculate TSDF for a particular platform or network, multiply the number of assigned time slots by the maximum number of pulses in each time slot, divide the total pulses for all assigned time slots by the base value of 396,288 pulses, and multiply the result by 100.

$$\text{TSDF (\%)} = \text{Total pulses in assigned time slot} = \frac{(A \times 258) + (B \times 144) + (C \times 444)}{396{,}288} \times 100$$

A = Number of time slots with a limit of 258 pulses (Standard Packing and Packed 2 Single Pulse)

B = Number of time slots with a limit of 144 pulses (Round Trip Timing)

C = Number of time slots with a limit of 444 pulses (Packed 2 Double Pulse and Packed 4 Single Pulse)

[8] "I" refers to "interrogate" and "R" refers to "reply" of the RTT message.