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CHAIRMAN OF THE JOINT CHIEFS OF STAFF INSTRUCTION

J-6
DISTRIBUTION: A, B, C

CJCSI 6232.01F
12 January 2023

LINK 16 SPECTRUM OPERATIONS AND DECONFLICTION

References: See Enclosure E

1. Purpose. This instruction implements policy to ensure Link 16 terminals (systems that transmit in the 960-1215 MHz frequency band using a Time Divisional Multiple Access (TDMA) waveform) operate in accordance with (IAW) National Telecommunications and Information Administration (NTIA) and U.S. Military Command, Control, Communications, and Computers Executive Board (MC4EB) spectrum certification guidance and comply with reference a. In particular, the operation of Link 16 systems must not exceed the spectrum certification limits for pulse density specified in reference b and identified in Enclosure C, and the Department of Defense (DoD) must adhere to the timeline stipulated in reference c. 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 CJCSI 6232.01E, 21 September 2012, "Link-16 Spectrum Deconfliction," is superseded.

3. Applicability

a. This instruction applies to Combatant Commands (CCMDs), Services, and Agencies (C/S/A) and all units/users operating Link 16 equipped systems within 200 nautical miles (nm) of the coastal United States and its Possessions (US&P).¹ 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 nm of the coastal US&P. North American Aerospace Defense Command (NORAD) forces are exempt from competing with other Link 16 activities during steady state and advanced force posturing. These platforms are exempt from scheduling/entering data into the deconfliction server.

¹ US&P is referenced in accordance with reference c.

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b. During armed conflict or the exercise of self-defense to the extent necessary by U.S. forces, pulse density limits and deconfliction policies contained in this instruction do not apply. This extends to participating foreign and/or coalition forces, to include Air Tasking Orders published to NORAD-U.S. Northern Command or U.S. Indo-Pacific Command forces and associated ground data link gateways.

4. Policy

a. Link 16 systems must not cause harmful interference to navigational aids operating in the frequency band allocated to Aeronautical Radio Navigation Service and Radio Navigation Satellite Service systems. 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 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.

(3) With Time Slot Duty Factor (TSDF) calculated IAW Navy Marine Corps Spectrum Center (NMSC) Instruction 2410.1 (Link 16 Time Slot Duty Factor Calculation Methodology). See reference d.

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 ensure operations comply with the restrictions cited in this instruction.

c. Outside the US&P

(1) CCMDs shall provide guidance for Link 16 system operations within foreign territories IAW host nation (HN) guidelines, restrictions, and approvals. Units must coordinate with the CCMD via the supported Component.

(2) General guidance regarding international frequency clearances may be found in the Link 16 Multinational Working Group Notebook at

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<<http://www.link16mnwg.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.

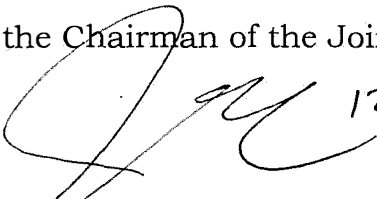
6. Responsibilities. See Enclosure A.

7. Summary of Changes. This revision clarifies business processes, organizational roles, responsibilities, and procedures for conducting deconfliction within the US&P, and reflects the most current restrictions and requirements on Link 16 system operations based on NTIA/MC4EB guidance.

8. Releasability. UNRESTRICTED. This directive is approved for public release; distribution is unlimited on NIPRNET. DoD components (to include the CCMDs), other Federal agencies, and the public may obtain copies of this instruction through the Internet from the CJCS Directives Electronic Library at <https://www.jcs.mil/library>. Joint Staff activities may also obtain access via the SIPRNET directives Electronic Library websites.

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

For the Chairman of the Joint Chiefs of Staff:



12 Jan 23

JAMES J. MINGUS
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 - References
- GL - Glossary

²<www.link16mnwg.org> is a Canadian sponsored website for the collaboration of multinational Link 16 users.

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ENCLOSURE A

ORGANIZATIONAL RESPONSIBILITIES

1. Joint Staff/J-6. The Director for Command, Control, Communications, and Computers/Cyber has 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 policy execution to ensure pulse deconfliction restrictions are adhered to by Link 16 system equipped units.
- d. Serve in a Link 16 Pulse Deconfliction Server (LPDS) Integrated Product Team (IPT) and Configuration Control Board (CCB) capacity as stipulated in reference e.

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

- a. Maintain, administer, and assist users in the operation of the LPDS. As the LPDS administrator, the NMSC will ensure events are updated 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 pulse deconfliction responsibilities as outlined in this instruction.
- d. Perform operational related support functions.
- e. Serve in LPDS IPT and CCB capacity as stipulated in reference e.
- f. In coordination with Service NDFs, ensure that the latest network designs are available for use with the LPDS.

g. 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 increased levels.

h. Provide terminal maintenance records upon NTIA/FAA request. DoD Certification Authority shall coordinate with the Service Spectrum Management Office (SMO) to request this data from the units/users.

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

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

k. Chair the CCB IAW reference e.

l. Publish/promulgate processes for TFA requests that exceed peacetime TSDF limits, or for Link 16 terminals that have not received Stage 4 spectrum certification from the NTIA.

3. C/S/As 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 ensure all Link 16 operations are deconflicted within the LPDS. 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 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 FAA upon request via the service SMO and DoD Certification Authority IAW reference b.

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

g. Services shall resource LPDS lifecycle sustainment IAW reference f.

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 CCMDs 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 Area of Responsibility, as appropriate, based upon the requirements contained in the individual HN's frequency clearance.

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

a. Coordinate with the LPDS Administrator 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 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 actual TSDF needed for each event based on planned usage. TSDF shall be calculated IAW reference d.

c. Using the LPDS, DCs will deconflict with other same-JOA or adjacent JOA users to ensure TSDF and contention use restrictions are not exceeded.

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

e. Promulgate, as necessary, JOA operating/utilization instructions to ensure Link 16 system spectrum use is equal to or below levels entered into the LPDS.

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.

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

a. Contact the Joint Frequency Management Office (JFMO) or go through Service SMO for specific requirements and to ensure an adequate frequency assignment has been approved for both the desired area of operations and the type of Link 16 system in use.

b. In cases where no assignment exists, or if the existing assignment is insufficient for the scope of operations, submit a TFA request to NMSC through the Service SMO. 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 Initialization Data Load (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.

e. In coordination with the NMSC, ensure that the latest network designs are available for use with the LPDS.

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

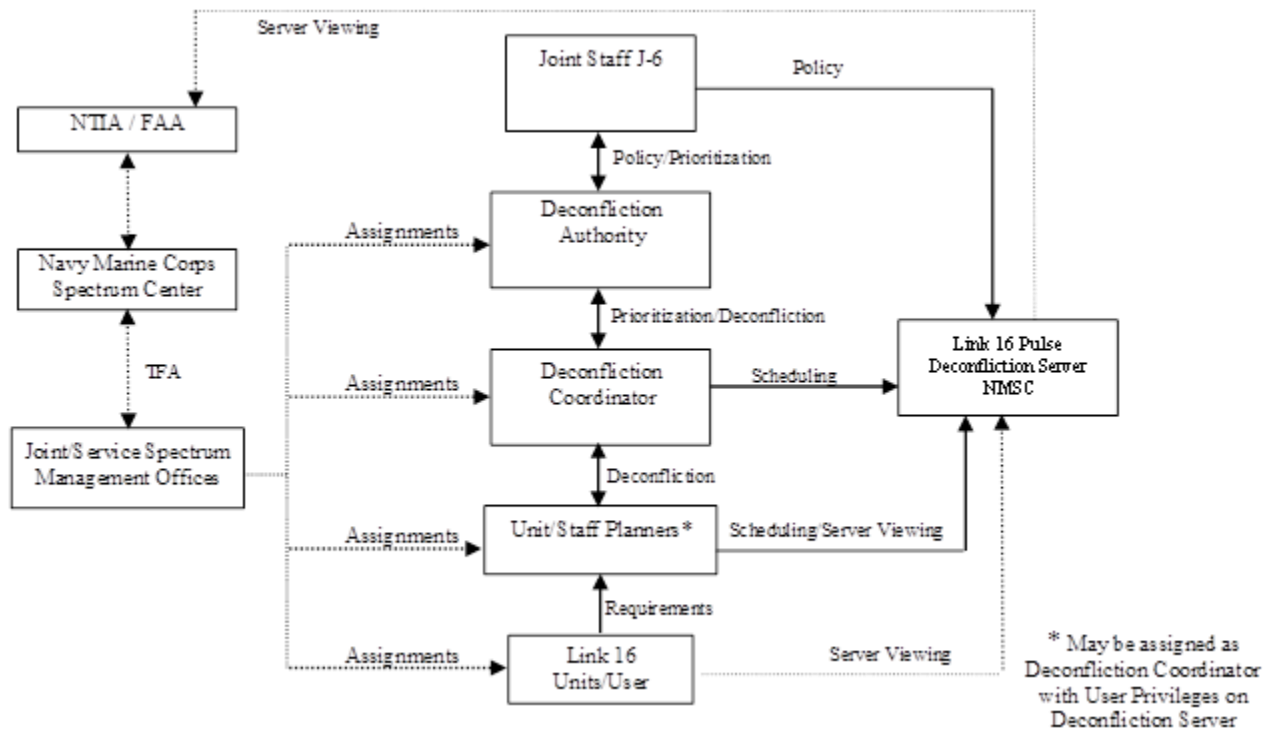


Figure 1. Organizational Relationships

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

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. Provide the maintenance records and EMC features data to DOD certification authority through the Service SMO, upon request from the NTIA/FAA. Users will need assistance from the manufacturer/program office to access the data that is automatically recorded and stored on each radio.

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ENCLOSURE B

UNITED STATES AND ITS POSSESSIONS PROCEDURES

1. The Link 16 Pulse Deconfliction Server. The LPDS, formerly known as the Joint Tactical Information Distribution System (JTIDS)/Multifunctional Information Distribution System (MIDS) Deconfliction Server (JDS), is an automated, internet-based system to support the Link 16 deconfliction process within the US&P. 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 deconfliction.

a. All Link 16 system use will be deconflicted through the LPDS. The appropriate DC (or unit/staff planner when authorized) will make entries into the LPDS, and obtain approval 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 in coordination with the LPDS Administrator.

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 chain to the NMSC.

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 IAW reference d, and determine appropriate operational measures to ensure compliance. Assistance can be obtained by contacting the LPDS Administrator 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 participants. LPDS TSDf entries must 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. The procedures and methodology for calculating TSDf are provided in reference d.

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.

(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 (e.g. non NTIA Stage 4 spectrum certified terminals). Enclosure C addresses conditions and restrictions for spectrum certifications and frequency assignments.

(3) For routine requests, the FAA requires a minimum of 30 calendar days of lead time to process TFA request. To allow for review and coordination, TFA requests must be submitted to NMSC 60 calendar days prior to the need date. Exceptions to late requests will be considered on a case-by-case basis. If

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lead time is not met, unit planner/requester should include an O-6/GS-15 endorsed mission/operation impact statement.

(a) Should a TFA fail to be submitted on time, units/users may be denied authorization to participate in Link 16 operations until approval is obtained.

(b) Frequency of assignment request submissions does not imply approval. An approved frequency assignment must be in place before commencement of operations. Once approval is obtained, units/users shall comply with restrictions/mitigations contained in the request-reply.

(4) Exceptions to Policy:

(a) Modifications/Changes to Submitted TFA's:

1. It is understood that operational schedules, requirements, and participating units routinely change before requested date of operations

2. To avoid delays in obtaining approval before the mission start date, the requestor must submit a TFA change and, in addition, provide justification addressing the changes to the submitted TFA.

(5) Emergent Requirements:

(a) An emergent request does not mitigate the need to bypass requirements for submission. Emergent requests shall be submitted to include an O-6/GS-15 endorsed mission/operation impact statement.

(b) Examples of Emergent Requests include, but are not limited to, Homeland Defense and National Contingencies.

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 in the LPDS. See Figure 2 for the process involved surrounding the use of the LPDS.

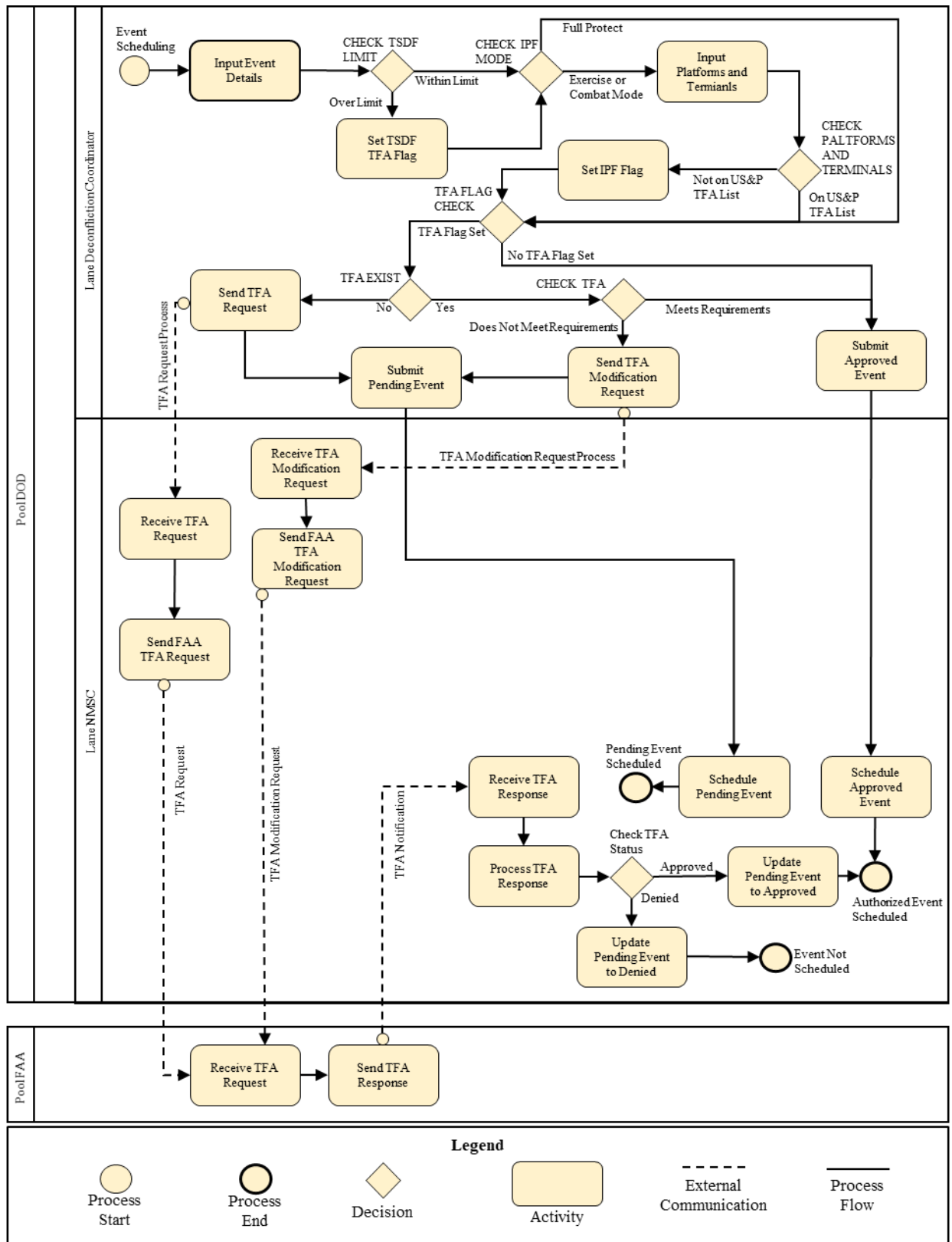


Figure 2. LPDS Event Scheduling Surrounding the TFA Approval Process

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(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, complies 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 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.

(d) Prioritize Transmission Control Protocol/Internet Protocol (TCP/IP) connections into the Link 16 network vice RF transmissions when possible based on theater architecture needs and individual platform capabilities.

(4) If the options in paragraph 2.d.(3) above are 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 to NMSC for coordination with 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 a response to NMSC.

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(b) NMSC will forward the response to the Service SMO, DC, or unit/staff planner, and the 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, and operations may commence only after the event is identified as authorized in the LPDS.

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.

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 (Interdepartment Radio Advisory Committee Document 35883, see reference b) 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 nm radius circle drawn around each fixed Link 16 system terminal, and within 100 nm of the JOA boundary for mobile unit Link 16 system terminals. 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).

b. No more than 400 percent TSDF is permitted within a 200 nm radius circle drawn around each Link 16 system terminal.

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 around 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

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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. See reference d for procedures and methodology for TSDF calculation.

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.

(b) The TSDF from centralized TSR is not to be counted toward the contention TSDF. For TSR operation not using centralized mode, the contention TSDF count shall be equal to the total TSDF in which TSR can occur multiplied by a factor X. If the number of TSR participants does not exceed the capacity of the TSR Demand Message (J0.7) for mutual dissemination, $X=1/4$; otherwise, $X=1/3$.

⁴ This is the contention (random) transmit access mode time slot assignments; see MIL-STD-6016, "Tactical Data Link (TDL) 16 Message Standard"

(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 for TSR transmissions not using centralized mode is equal to the total TSDF of all the operational TSR pools other than those operating in centralized mode 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 TSDF.

9. Restrictions Near Tactical Air Navigation (TACAN) and Distance Measuring Equipment (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 coordinated⁵ 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 and Exercise Modes 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. 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). If the terminal does not have the capability to store this data, then this applicable information shall be kept manually and be available to the DoD Certification Authority and NTIA upon request.

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.

b. Except for specifically approved special events, such as network enabled weapons testing or unique DoD training requirements, after 1 January 2025 frequency assignments will only be considered for Link 16 TDMA waveform terminals operating in Full EMC Protect Mode.

13. Required Separation Distance From ATC Equipment. Enclosure D shows the worst-case theoretical standoff distances from ATC equipment based on Link 16 system to-ATC equipment antennas main beam-to-main beam gain conversion. First, determine if it is possible to maintain the standoff distance indicated in Enclosure D. 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 Enclosure D 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. The following subparagraphs contain general considerations to use when planning where to place Link 16 system 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.

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. Aircraft. The distance separation guidelines presented in Enclosure D 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.

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Enclosure C

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ENCLOSURE D

PLATFORM DISTANCE SEPARATION REQUIREMENTS

Table D-1. 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
AIRCRAFT								
200W Aircraft on Ground	53	0.35	0.99	1.00	1.03	1.06	1.94	2.11
80W Aircraft on Ground	49	0.13	0.38	0.38	0.39	0.40	0.74	0.80
63W Aircraft on Ground	48	0.13	0.37	0.37	0.39	0.40	0.73	0.79
GROUND TERMINALS								
200W Ground Terminal (excluding DPV-75A antenna)	53	0.42	1.16	1.17	1.21	1.24	2.29	2.48
200W Ground Terminal (DPV-75A antenna)	53	0.84	2.34	2.37	2.45	2.51	4.61	5.00
63W Ground Terminal	48	0.18	0.50	0.50	0.52	0.53	0.98	1.06
8W HHL-16	39	0.05	0.13	0.14	0.14	0.14	0.26	0.29
SHIPS (200W)								
SHIPS, LEGACY	53	0.19	0.53	0.53	0.55	0.57	1.04	1.13
SHIPS; LCS MOS	53	0.12	0.33	0.34	0.35	0.36	0.65	0.71
SUBMARINE	53	0.07	0.19	0.19	0.19	0.20	0.37	0.40

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

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 33583/4, 11 May 2016
- c. Manual of Regulations and Procedures for Federal Radio Frequency Management, 2021 Edition, January 2021, U.S. Department of Commerce, National Telecommunications and Information Administration
- d. Link 16 Time Slot Duty Factor Calculation Methodology, NMSCINST 2410.1, August 2018, Department of the Navy, Navy Marine Corps Spectrum Center
- e. Configuration Management Plan (CMP) for the Link 16 Pulse Deconfliction Server (LPDS), 7 December 2011
- f. DoD Chief Information Officer Memorandum for Lifecycle Sustainment Funding for Link-16 Pulse De-confliction Server (LPDS), 26 May 2020

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Enclosure E

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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

ATC	Air Traffic Control
ATCRBS	Air Traffic Control Radar Beacon System
BIT	Built In Test
C/S/A	Combatant Commands, Services and Defense Agencies
CCB	Configuration Control Board
CMP	Configuration Management Plan
CPSR	Conditional Paired Slot Relay
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
FAA	Federal Aviation Administration
HN	Host Nation
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
JOA	Joint Operating Area
JTIDS	Joint Tactical Information Distribution System
LCS	Littoral Combat Ship
LPDS	Link 16 Pulse Deconfliction Server

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MC4EB	Military Command, Control, Communications, and Computers Executive Board
MHz	Megahertz
MIDS	Multi-Functional Information Distribution System
MOA	Memorandum of Agreement
MOS	MIDS on Ship
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
RR	Repromulgation Relay
RTT-B	Round Trip Timing Broadcast
SMO	Spectrum Management Office
TACAN	Tactical Air Navigation
TCP/IP	Transmission Control Protocol/Internet Protocol
TDL	Tactical Data Link
TDMA	Time Division Multiple Access
TFA	Temporary Frequency Assignment
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/frequency band, for a specified type of service 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/MIDS-Joint Tactical Radio (JTIDS/MIDS/MIDS-JTRS). 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.

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. 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 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

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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),⁶ 258, or 444 pulses, depending on the use for the slot and the packing limit assigned.

⁶ “I” refers to “interrogate” and “R” refers to “reply” of the RTT message.

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