



# Department of Defense INSTRUCTION

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ASD(NII)/DoD CIO

SUBJECT: Precise Time and Time Interval (PTTI) Management

- References:
- (a) DoD Directive 5144.1, "Assistant Secretary of Defense for Networks and Information Integration/DoD Chief Information Officer (ASD(NII)/DoD CIO)," May 2, 2005
  - (b) DoD Directive 4650.05, "Positioning, Navigation, and Timing (PNT)," February 19, 2008
  - (c) DoD Instruction 5105.18, "DoD Intergovernmental and Intragovernmental Committee Management Program," July 10, 2009
  - (d) Military Critical Technologies List, June 2009<sup>1</sup>
  - (e) Chairman of the Joint Chiefs of Staff Instruction 3170.01G, "Joint Capabilities Integration Development System (JCIDS)," March 1, 2009

1. **PURPOSE.** This Instruction:

- a. Establishes policy and assigns responsibilities to define DoD PTTI management in accordance with the authority in Reference (a) and the guidance in Reference (b).
- b. In accordance with Reference (b), provides procedures for coordination of PTTI requirements and maintenance of a PTTI reference standard (astronomical and atomic) for use by all DoD Components, other Federal agencies, DoD contractors, and related scientific laboratories. This includes programming the necessary resources to maintain the reference standard and to disseminate precise time to DoD users.
- c. In accordance with Reference (c), establishes the PTTI Working Group as the primary advisory body to the DoD Positioning, Navigation, and Timing (PNT) Executive Committee and the Assistant Secretary of Defense for Networks and Information Integration/DoD Chief Information Officer (ASD(NII)/DoD CIO) on all PTTI matters.

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<sup>1</sup> Available at <http://www.dtic.mil/mctl/MCTL.html>

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

3. DEFINITIONS. See Glossary.

4. POLICY. It is DoD policy that:

a. The DoD reference standard for PTTI is that which is established by the Department of the Navy at the United States Naval Observatory (USNO) in accordance with Reference (b). All systems that use precise time or precise frequency shall use this reference standard. In accordance with Reference (b), the Superintendent, USNO, shall function as the DoD PTTI Manager.

b. The maximum practicable interchange of PTTI information shall be effected throughout the DoD. In this regard, it is incumbent upon PTTI users to submit requirements for PTTI to the DoD PTTI Manager whenever such requirements are identified and formulated.

c. PTTI planning and coordination shall be supplemental to, and operate within, the current planning, programming, and budgeting system.

5. RESPONSIBILITIES. See Enclosure 1.

6. PROCEDURES. See Enclosure 2.

7. RELEASABILITY. UNLIMITED. This Instruction is approved for public release and is available on the Internet from the DoD Issuances Website at <http://www.dtic.mil/whs/directives>.

8. EFFECTIVE DATE. This Instruction is effective upon its publication to the DoD Issuances Website.



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Enclosures

1. Responsibilities
2. Procedures

Glossary

ENCLOSURE 1

RESPONSIBILITIES

1. ASD(NII)/DoD CIO. The ASD(NII)/DoD CIO, as the Principal Staff Assistant for overseeing DoD PNT policy in accordance with Reference (a), shall:
  - a. Provide guidance for the overall development, coordination, and approval of major DoD PTTI policies and plans, and serve as the final authority in consolidating DoD PTTI programs.
  - b. Through the DoD PTTI Manager, ensure that the procedures for DoD PTTI programs in Enclosure 2 are implemented.
  - c. Coordinate with the DoD PTTI Manager on PTTI policy negotiations between the DoD and other Federal agencies and international organizations.
  
2. ASSISTANT SECRETARY OF DEFENSE FOR RESEARCH AND ENGINEERING (ASD(R&E)). The ASD(R&E), under the authority, direction, and control of the Under Secretary of Defense for Acquisition, Technology, and Logistics, shall coordinate with the DoD PTTI Manager regarding DoD research programs concerning PTTI.
  
3. HEADS OF THE DoD COMPONENTS. The Heads of the DoD Components shall:
  - a. Appoint a DoD Component PTTI Coordinator who will coordinate their Component's PTTI operational and research programs with the DoD PTTI Manager and serve as a member of the PTTI Working Group (WG).
  - b. Advise the DoD PTTI Manager of the name and contact information of the Component PTTI Coordinator.
  - c. Oversee the activities of their respective Component PTTI Coordinator.
  
4. COMMANDER, U. S. STRATEGIC COMMAND (CDRUSSTRATCOM). The CDRUSSTRATCOM, in addition to the responsibilities in section 3 of this enclosure and as the operational PNT Commander, shall:
  - a. Provide the operational support to the PTTI WG.
  - b. Notify PNT operational users of a leap second insertion.

ENCLOSURE 2

PROCEDURES

1. COORDINATION. Coordination of the DoD PTTI program shall be implemented through the DoD PTTI Manager, acting jointly with the Component, Federal agency, and related scientific laboratory PTTI Coordinators.
  
2. DoD PTTI MANAGER. The DoD PTTI Manager, in accordance with Reference (b), shall:
  - a. Ensure interoperability in PTTI operations.
  
  - b. Maintain the master time and frequency standard for the DoD and the underlying timing reference for coordination of all U.S. Government PNT systems.
  
  - c. Make standard time and frequency information available to users.
  
  - d. Coordinate DoD PTTI standards with recognized national and international standards.
  
  - e. Advise the ASD(NII)/DoD CIO on the coordination of time scales.
  
  - f. Develop and publish detailed information concerning DoD PTTI reference standards.
  
  - g. Advise the ASD(NII)/DoD CIO on PTTI policy matters involving DoD Components and participate in PTTI policy negotiations between the DoD and other Federal agencies and international organizations.
  
  - h. Provide notification of leap second changes in accordance with the following:
    - (1) Submit an "All DoD" message for the ASD(NII)/DoD CIO to transmit within 2 weeks of notification of a pending leap second insertion but no later than (NLT) 8 weeks prior to the insertion of a leap second. Submit a follow-up "All DoD" message leap second reminder sent out by the ASD(NII)/DoD CIO 1 month prior to the insertion of a leap second.
  
    - (2) Coordinate with CDRUSSTRATCOM to ensure operational users are notified NLT 1 month prior to the insertion of a leap second.
  
  - i. In coordination with the DoD Components, develop annual summaries of PTTI requirements and status. Provide a copy of the summary to the ASD(NII)/DoD CIO.
  
  - j. Review and validate existing and future PTTI requirements of the DoD Components and maintain a database containing users of precise time and frequency and their requirements within the DoD.

k. Maintain a website of PTTI information including, but not limited to, such elements as Master Clock performance characteristics, dissemination systems and their characteristics, equipment required to access various dissemination systems, definitions, relevant documents, and frequently asked questions. Ensure the availability of such data is widely publicized.

l. In coordination with the ASD(R&E) and DoD Components, coordinate DoD research programs concerning PTTI.

m. Provide time and frequency advice to Government and DoD contractor personnel. Ensure funding reimbursement is obtained for services that require a substantial amount of personnel time. Such services include, but are not limited to:

(1) Consultation on DoD acquisition programs related to PNT.

(2) Assistance in the preparation of the Military Critical Technologies List (Reference (d)).

n. Coordinate all DoD time calibration and testing service offered by DoD organizations and laboratories.

(1) Maintain calibration and testing services on a reimbursable basis for time standards, transfer devices, and systems.

(2) Maintain a database of calibration and testing results to support DoD users' system engineering and procurement requirements.

o. In coordination with the ASD(NII)/DoD CIO, represent the DoD in national and international forums on PTTI topics.

## 2. DoD COMPONENT

a. Refer time and time intervals to the standard established by the Department of the Navy at the USNO, and maintain specific time scales, as required, such that the relationship of each to the established standard is known.

b. Prescribe technical requirements for the coordination of PTTI techniques, procedures, and periodic calibration of systems.

c. Prescribe in-house procedures for the development, coordination, and consolidation of their respective DoD Component PTTI requirements.

d. Assist the DoD PTTI Manager by providing technical information on current and prospective PTTI requirements in the format prescribed by the DoD PTTI Manager.

e. Ensure that PTTI requirements for systems and programs of the DoD Component and user agencies are coordinated with, and approved by, DoD Component PTTI Coordinator.

f. Promote economy by prescribing requirements for precise time that are consistent with operational and research needs for accuracy.

### 3. PTTI WG

#### a. Composition

(1) The PTTI WG shall be chaired by the DoD PTTI Manager.

(2) The PTTI WG membership shall be composed of the DoD Component PTTI coordinators.

(3) Additional WG members may be assigned by respective DoD PTTI WG leads as required to assist in formulating organizational positions for their respective DoD PNT Executive Committee principals.

b. Function. To accomplish its objectives in support of the DoD PNT Executive Committee, the PTTI WG shall meet at least quarterly and shall:

(1) Review and comment on PTTI-related policy, doctrine, and DoD issuances.

(2) Within existing corporate processes, such as the Joint Capabilities Integration Development System described in Chairman of the Joint Chiefs of Staff Instruction 3170.01G (Reference (e)), review and advise on the assessment of existing and potential PTTI capabilities and capability shortfalls.

(3) Function as the single body that develops recommendations for the DoD PNT Executive Committee action through regular meetings and a systematic coordination process.

(4) Provide a joint forum to facilitate compatibility of technologies and applications related to PTTI.

(5) Review and validate existing and future PTTI requirements of the DoD Components. Develop annual summaries of PTTI requirements and status.

(6) Review DoD research programs concerning PTTI and participate in OSD PNT Science and Technology Roadmap development.

GLOSSARY

PART I. ABBREVIATIONS AND ACRONYMS

ASD(NII)/DoD CIO	Assistant Secretary of Defense for Networks and Information Integration and Department of Defense Chief Information Officer
ASD(R&E)	Assistant Secretary of Defense (Research and Engineering)
CDRUSSTRATCOM	Commander, United States Strategic Command
NLT	no later than
PNT	Positioning, Navigation, and Timing
PTTI	Precise Time and Time Interval
USNO	United States Naval Observatory
WG	Working Group

PART II. DEFINITIONS

These terms and definitions are for the purpose of this Instruction.

leap second. Civil time is occasionally adjusted by 1-second increments to ensure that the difference between a uniform time scale defined by atomic clocks does not differ from the Earth's rotational time by more than 0.9 seconds. In order to keep this cumulative difference less than 0.9 seconds, a leap second is added to the atomic time to decrease the difference between the two. This leap second can be either positive or negative depending on the Earth's rotation.

Master Clock. The underlying product for all precise time and time interval products. The single authoritative clock providing the real time representation of Coordinated Universal Time for all of the DoD. An ensemble of clocks maintained at the USNO is used to ensure the accuracy and consistency of the authoritative clock.

precise time. A frequency (time interval) requirement accurate to within 1 microsecond ( $10^{-6}$  s).

time. The designation of an instant (e.g., epoch) on a selected time scale, astronomical or atomic. It is used to refer to the time of day.